Em Baker

The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

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NOVEMBER 1939

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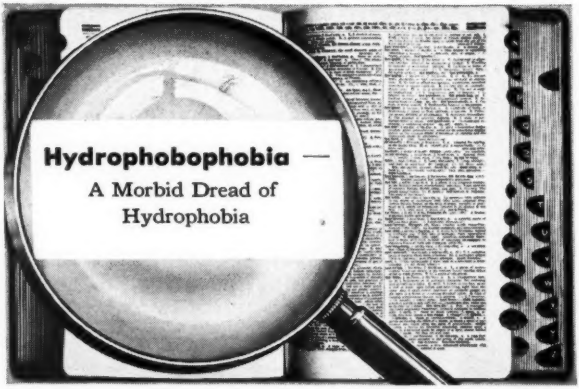

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The Monthly Review

Published by the AMERICAN ELECTROPLATERS' SOCIETY, Inc.

A Society for the Advancement of the Science of Electroplating

NOVEMBER 1939

W. J. R. KENNEDY
Editor

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Associate Editor

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The Monthly Review

Published by the
AMERICAN ELECTROPLATERS' SOCIETY, INC.

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Editorial

We believe this publication has no real function as regards politics. Numbered among the members of the Society are probably Democrats and Republicans, Conservatives, Liberals and Socialists, and if the truth were told, perhaps there are some Fascists and Communists. We don't know, and anyway it is none of our business.

However, the economic welfare of our membership is distinctly our affair and it is difficult in troubled times to entirely divorce politics from editorial discussion, and at the same time to minister to the economic welfare of our membership.

We have no desire to attempt to formulate or direct your political opinions. However, this country is being faced with momentous decisions; decisions upon which hinge your future economic welfare and possibly even the continuance of your life.

Under the circumstances we feel that if we can point out the underlying facts so as to make the picture clearer to you, in order that you may make your own decision intelligently, that it is not only our privilege but our duty to do so.

We have been struck lately by a strange anomaly. A few years back, we were told repeatedly and heatedly that financial interests and manufacturers seeking war profits had been the cause of our entrance into the former war. Today we can hardly pick up a newspaper without seeing some statement from a banker or the head of some large manufacturing corporation to the general effect that there can be no profit in war.

It does not hang together, and yet there is justification for the charge that profit seeking by many diverse interests was certainly a very large contributory cause to our entrance into the previous war.

Let's try to analyze what actually happened and see wherein lies the difference now.

You must get clear in your own mind that there were two distinct periods between 1914 and 1919, the first before we went into war, and then the period while we were a combatant. Any clear understanding of events must take this into consideration.

Europe went to war and while we were pretty slow to find it out, eventually we learned that war meant need for copper and

steel and wheat and cotton and zinc and lead and meat and textiles and chemicals and airplanes and trucks and ships and a multitude of other raw materials and finished products. Furthermore Europe was willing to pay sweet prices to get them. They got them but they did not pay for them. What they did was either to arrange individual credits with the producer, or sell bonds in this country and use the proceeds to pay producers.

Everybody was busy; everybody was making money, at least on paper, and the goose was hanging high. Everybody either directly or indirectly had a stake in the success of the Allies.

Then it began to be doubtful that the Allies would win without physical assistance. A country that only a few months before had re-elected Wilson because he had kept us out of war, practically over-night shifted to war fever and we were in it. There were other contributory factors, but there is no disguising that financial considerations was at least one of the main reasons.

We entered the war and the United States Government assumed all of these past debts of the Allies, taking the various I.O.U's of England, France and other nations in exchange. In other words we paid in good American money for everything purchased prior to our entrance and took pieces of paper therefor.

As practically none of these obligations were met, it means that we sent our raw materials and finished products to Europe and received nothing in exchange. In other words we paid not only for our own expenses after we entered the war but for a large part of the expenses of the Allies before we entered. We had sent a vast amount of material of all kinds to Europe, and economically we were just that much worse off than if there had been on war in spite of the fact that the average individual had apparantly been prospering.

The complexities of modern money, credit and transfer systems tend to obscure the simple basic fact that if any country sends goods to another country, it must take back goods in exchange eventually, or it is the loser, regardless or whether temporarily everybody in the sending country keeps very busy producing those goods.

Please keep that simple fact in mind, and examine all propositions in the light of it, which will be brought forward in the next few years, and you may save a lot of confusion.

We went into the war, assumed the past debts of the Allies in this country, and started to pile up our own debts. The principle on which the Allies had proceeded previously was to pay enough to make it attractive to produce whatever was needed, and our own government adopted the same policy and continued it.

However, there was one important difference. Whereas previously the Allies had put money into circulation (it was our money but it did increase circulation) everybody received the benefit of that increased circulation, no matter what he produced. When we went into the war, our job was to win the war, not to make money. Our government made it attractive to produce things needed by them to win the war, but at the same time, they began to make it extremely difficult to produce anything that did not directly aid in that result.

Millions of men were taken out of industry to become soldiers which caused a shortage of labor and the government did not propose to see the remaining labor used to produce what to them was non-essential.

They attempted to control this in different ways. They built up new or took over existing facilities in certain vital industries such as ship-building, airplane manufacturing, and railroads, and actually operated them under direct government supervision.

They built up a system of priority certificates so that in order to secure raw materials, a manufacturer was supposed to be allotted in order of importance as regards the winning of the war. In theory it was beautiful. Practically it did not work very well.

The idea was that a manufacturer producing articles for direct war use should have first call on raw or other materials; then manufacturers making articles with indirect aid to military purposes should receive what was available; and then if there was any left over, manufacturers producing solely for civilian consumption would get it.

It seemed all right, but it did not pan out very well. Manufacturers with high rating priority certificates placed orders to protect themselves for so much material that there was not a chance for anyone else, if the system had been rigidly followed.

It wasn't. There was no real way of watching everybody, and while an individual producer took a chance in giving material to people not strictly entitled to it, he could not forget that the war would be over some day, and when one of his good peace-time customers wanted material, perhaps he furtively slipped him some. However, it was becoming more and more difficult for the manufacturer without priority to secure material, and undoubtedly if the war had continued much longer, they would have been completely blocked off. For instance, the automobile industry had been proceeding with extreme difficulty all the last year of the war, but had the war continued two months longer, there would not have been a passenger car built in America. The edict had been out since summer that on the first of January all production was to cease.

It had been difficult but not impossible for a large part of the

manufacturers to continue to produce for the civilian population, but there is no question that it would not have lasted much longer.

From the stand-point of the War Department, the system did not work as well as expected and they learned a good deal. The next time they will not make that mistake, in all probability. There will be absolute control, and just what that will do to your individual business or occupation, is something for you to figure out for yourself.

The heads of large corporations are perfectly well aware that if we enter another war, all manufacturing resources will probably be mobilized immediately for war purposes, and a good many of them do not fancy that prospect at all. Furthermore, they learned that the apparent profits of the last war were somewhat evanescent.

Industry was being converted to produce things other than they had been making, and that required special equipment which had to be scrapped when the war was over. The government was paying what seemed good prices for everything, but when the investment and its eventual loss is taken into consideration, there was not much net profit in a lot of cases.

In addition, while the government distributed with one hand, it took away with the other. Surplus profits taxes were invented. First they gave it to them and then they took it back in the form of taxes. What they did the last time will probably be mild compared to what would happen in the future. The chances are that there would be very little net profit, if any. You can just take it for granted that if we go into another war, manufacturers will not be allowed to make any great net profits, even if they are permitted to retain and run their businesses.

As for the individuals, some people gained by the last war. Farmers who owned their land in fee simple, and did not purchase at inflated prices after the European War started, probably came out pretty well. Some speculators cleaned up and if they had foresight enough to get out before the '21 smash, perhaps they really got away with it. That applied not only to stock but to many commodities. Of course, a great many of them lost their paper profits entirely, either through the stopping of the war, or by the '21 debacle.

A minority of the population who worked in specially favored and vital industries, probably gained. Their wages were comparatively high. However, the average individual who worked in other occupations, while he probably received a few more dollars, was actually worse off. Perhaps his income went up 25% but everything he bought jumped 100%. His net was much less.

There seems to be no disposition to have any specially favored industries if we enter war again. You, will probably work at what you are told to do and like it, and you will be paid an amount that

will help carry the cost of the war as we go along, and you will like that, too.

The manufacturer will not profit, in all likelihood, by our entrance into the war, and it is extremely doubtful that the individual will do so.

Certainly the country as a whole will not profit. It is not possible to shoot away good material that could be used for making baby carriages or automobiles or kitchen untensils or something else for the comfort and well-being of someone, and not be poorer, as a nation.

The situation at the present time is this: we can sell anything wanted, provided it is bought for cash and carried away in the ships of some other nation. The British press to the contrary, the Allies can buy and pay cash for a considerable period. They have in this country a large amount of gold sent here for safekeeping before the war, which actually belongs to them. It is somewhat risky but they can transport additional gold, and they possess the gold. In addition, their nationals own a very large amount of securities in American corporations. These securities could be sold here.

Just how much could be raised by the total of the three methods, no one can say accurately but it is a certainty that it is a good many billion dollars. War is a pretty costly performance today. Where they used to number airplanes in hundreds, now they talk of thousands. Other things are in proportion. How long they can buy and pay cash, is anybody's guess, but the chances are that it will not be less than a year. Our real problem does not arrive until that period is up.

In the meantime, they will be getting what they need and we will not be getting involved from a financial angle. We will undoubtedly receive back the ownership of our own securities. To that extent our sales will be an economic gain. We will also get considerable gold. It is not so sure that this constitutes gain.

Right now we have enough gold to fill all our teeth until Gabriel blows his horn; we can deck our women out like the favorite wives of African princes, including the anklets and nose rings; and still have sufficient gold to support a currency system. Just what advantage any more gold could be to us, is a good deal of a question, unless we are willing at some future time to send that gold elsewhere and take goods in exchange. We have not exhibited any such tendency in the past. The corollary to that proposition is that it might mean stagnation of our own industries. It is not likely that we would do it. If we are going to retain the gold indefinitely, then there is really grave doubt that we would not actually be better off with our oil, coal, copper, iron, zinc, etc., still buried in our ground, where it can be dug up and used in the future, than to bury a lot more gold down in Kentucky. With the whole world going to war over the control of raw materials, and particularly metals, we appear a trifle profligate with ours.

However that is all settled and there is nothing about which to talk now. We are going to take the gold as long as it lasts. That system seems a distinct improvement over what happened the last time in a good many ways.

If they have to pay cash on the barrel-head, they will not buy any more than they really need, and they will not ravage our metal supplies more than is necessary. In addition, it removes the temptation to sell their metal to the enemy via a neutral for gold and then use ours which can be bought for credit.

Our real decision will have to come when they are no longer in a position to pay cash. Now maybe we are threatened by the aggrandizement of Germany, and maybe the British Navy is our first line of defense and maybe the Allies are fighting our battle. That is possible. If the American people decide that this is true, then we certainly would be crazy to with-hold anything from them which they needed. If we do decide that way, let's be honest about it. Let's say "We recognize that you are carrying on a fight which we might otherwise have to do, ourselves, if not right now, perhaps in the future. Under the circumstances, we are going to see that you are supplied with everything which you really need for successful prosecution of the war. There is no question of payment involved. This is an outright gift".

Then if we get into the war, it will be because we consider it necessary for our safety, and not to protect an investment which does not exist anyway except in our imagination. After we had drained them of gold, they could not possibly pay in any other manner than by shipment of goods, and we do not want the goods, so why kid ourselves?

On the other hand, if the American people decide that this is a private fight over who is going to control certain portions of the sources of raw materials and that we are not directly involved regardless of the outcome, then we would be still crazier if we sent our valuable materials in exchange for promises which we knew they would not keep, and which we would not want them to keep even if they were willing. We could take that same money and those materials and build ourselves up to a position that no one would dare attack us.

We believe there has been altogether too much high-sounding bunk talked on both sides of this question and that it is about time for someone to begin talking about it in plain language and without mincing words.

If this war ever emerges from the comic opera stage, it means that this nation is eventually going to have to make a real decision and its citizens should begin to acquaint themselves thoroughly with all of the facts and all of the possible consequences, so that when the time for decision comes, it can be done soberly and with full knowledge of what we are doing.

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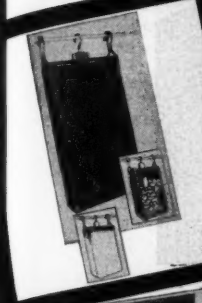

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OLIVER J. SIZELOVE

OLIVER J. SIZELOVE PASSES AWAY

Every member of the A.E.S., who knew Mr. Oliver Sizelove, Sales Manager of the Frederick Gumm Chemical Co., were stunned when the news of his death was announced from his home at Irvington, N. J.

Oliver was taken to Presbyterian Hospital, Newark, early last week to undergo an operation for gallstones. Apparently everything was successful, but later in the week peritonitis set in which caused his death on Friday, November 17.

Born in Hamilton, Ohio, 59 years ago, he first started work with State Stove Co., in that city. In 1911 he came to Newark, and worked in several of the large shops including the Elite Novelty Co., where he developed plating solution control. Leaving this company, he started in the job plating business with John Merigold. He then worked for the J. K. Osborne Co., in Harrison, and also with August Gertz Co., in Newark until that company dissolved.

Mr. Sizelove joined the Frederick Gumm Chemical Co., in January 1934,

and had the pleasure of seeing the business grow and prosper each succeeding year.

He studied chemistry at Newark Technical School and afterwards taught electroplating classes in the Newark Vocational School.

He was always prominent in the activities of the Newark Branch of the A.E.S, and was Vice-Chairman of the International Fellowship Club, June 1937-1938, and Chairman, June 1938-1939.

His wife, the former Mrs. Bessie Shields, of Cleveland to whom he was married about a year and a half ago and three children by his first wife survive him. Oliver who is now Professor at Newark School of Engineering, Robert with the Frederick Gumm Co., and Elizabeth, wife of Prof. Henry Arnold, Upsala College, Montclair, N. J.

Funeral services were held at Irvington on Sunday Evening, November 19, Rev. Edward J. Paezold, Pastor of Emanuel Evangelical Church, officiating.

Representatives from several Masonic Lodges, The Elks, and a great many members of the A.E.S., from New York, Newark, Bridgeport, New Haven, Waterbury, Springfield, Baltimore-Washington, Philadelphia and other Branches were present.

Officers of the Irvington Lodge, of which Mr. Sizelove was a member, held their Masonic Ritual Service at the close of the Church service.

The large number of wreaths and floral pieces bore mute testimony of the love and esteem in which Oliver was held both as a husband, father, business man and friend. The well attended funeral service gave further proof of the strong bond of affection that existed between our deceased brother and the members of the Society.

Our deepest sympathy is extended to Mrs. Sizelove and family in the hour of their bereavement. May they find comfort in the thought that Oliver's memory will be cherished in the history of our organization and that he will live on in the hearts of those he leaves behind.

After final services were held on Monday, November 20, the body was taken to the Linden, N. J., cemetery for cremation.

1940 Convention

As a manufacturing center with its 434 factories, Dayton supplies a varied list of products to the world. It was here that a number of important inventions were made such as the airplane, the cash register and self-starters for automobiles. Besides being the birthplace of these products, Dayton is also considered the cradle of electric refrigeration. General Motors has established two units here which are devoted entirely to the manufacture of air-conditioning equipment and electric refrigerators.

For those who attend the 1940 Convention, their visit to Dayton would not be complete without a few trips through some of

our modern factories. The Factory Visitation Committee has already made tentative arrangements so that two or more of these plants will be scheduled for inspection tours.

The National Cash Register Company with one of the most

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modern plating departments in the country, the Frigidaire Corp., with its full automatic Bonderizing unit, and other companies with their various types of equipment used to obtain special finishes, will provide an opportunity for those attending the convention to study the straight line production methods employed in Dayton.

The Branch feels that with such a program of inspection trips outlined, the educational value of the convention will be increased.

Anodic Treatment *of* Aluminum

By HENRY A. SMITH, *B. A., Sc.*
Coulter Copper & Brass Co., Ltd.
Toronto, Canada
Paper read at Buffalo Branch, A. E. S. Nov. 10, 1939

MR. President and Gentlemen, on the occasion of this first visit of the Toronto members to a meeting of the Buffalo Branch, I feel a considerable measure of pride in the privilege of a place on your program.

I intend to speak tonight on the phase of my firm's activities which is my particular interest. Anodic Treatment of Aluminum.

1. REASONS FOR ANODIC TREATMENT OF ALUMINUM

The fields of application enjoyed by two metals provide an interesting example. In eighteenth century Russia stovepipes were made of platinum - they were good stovepipes too, even if a trifle heavy. As late as 1854 aluminum was worth almost its weight in gold. Napoleon III's regal guests felt honoured to dine from aluminum dishes. Today platinum has but rare applications and aluminum is at every hand. It is quite logically so for aluminum is the third most plentiful element in the earth's crust, being only exceeded by oxygen and silicon. Due to its lightness, ductility, cheapness, high reflectivity and non-poisonous properties aluminum has found wide application. The ease with which it can be worked to a high lustre and its ability to retain a relatively pleasing appearance over long periods of usefulness, are well known. However, in several fields aluminum and its alloys, while having certain most desirable properties - lightness, strength, lustre, and easy work-ability were found to lack in corrosion resistance.

Outdoors, aluminum may show rapid depreciation if situated so that it remains moist for extended periods, particularly in regions near the sea. This moisture produces an incipient surface attack which, while not deep, sufficiently roughens the surface that it readily collects and holds dirt. This dirt film forms an excellent ally to the moisture for continued attack of the base metal. In applications where appearance and reflectivity are important, as in storefront construction and reflectors, this rapid deprecia-

tion of aluminum is most undesirable. Many examples of this can be seen on storefronts right in our own city. Resistance against such attack can be added by lacquering the surface, but even the best of lacquers and clear varnishes are not particularly durable under long exposure to light.

Another process of finishing aluminum is available, namely: by electrolytic or anodic oxidation which produces on the metal a hard abrasion resistant oxide coating.

2. HISTORICAL DEVELOPMENT OF ANODIC TREATMENT EQUIPMENT

Anodic films electrolytically formed on aluminum have been the subject of much investigation. Probably the earliest application was in the chemical rectifiers using boric acid as an electrolyte. This was likely more familiar in the early days of home-built radios when we were trying to charge storage batteries in every household. This type of layer is still in very general use in every home in our present day radios, in the form of the electrolytic filter condenser. This layer is impermeable - that is - once formed it does not permit the passage of any current till the voltage exceeds the breakdown limit of the layer.

The type of Anodic Treatment I intend to speak about tonight is known as a permeable film - that is - the film is permous to the electrolyte oxide formation within limits. A point is reached where the outside of the layer dissolves as fast as new metal is oxidized by the flow of current.

Much of the credit for the early investigations and developments in the Anodic Protection of Aluminum must go to a Mr. H. Sutton of the Royal Aircraft Establishment. Aircraft in the Naval Air Service subjected their aluminum components to particularly severe corrosion and it was to overcome this that the Air Ministry developed the first method of Anodic Oxidation. This method employed 3% chromic acid, the aluminum being made the anode and the steel tank the cathode. The voltage starting at 3 or 4 volts and being raised during a 15 minute period to about 40 volts. This voltage was held for the next 35 minutes and then raised to 50 volts for the final 5 minutes treatment. The layer was comparatively thin and quite grey in appearance. Its usefulness was mainly in forming an excellent primer for protective layers of paint.

Other investigations have found methods of producing oxide layers anodically which are in common use in various localities of this terrestial sphere. Flick in U. S. found that a dense adherent coating could be produced by anodic treatment in ammonium hydroxide or ammonium sulphide with a potential of 220 volts for a period as short as one minute.

In Japan both chromic acid and Oxalic acid treatments are used. In Germany mixtures of chromic and oxalic acid are in common use, requiring quite high voltage. In U. S. and in the plant with which I am connected the electrolyte is Sulfuric Acid requiring a much lower voltage than commonly used by the previously mentioned methods. This process is known as Alumiliting. It was originally developed by Stafford O'Brien, the patents being acquired by Aluminum Colors Corporation, of Indianapolis, and later by the present patent holders, the Aluminum Company of America.

This patent is a striking contrast to that on Chromium Plating. So far as I know, infringements have been vigorously suppressed and the license holders are secure under the protection afforded by the Aluminum Co. I will say this, though, while my firm held their rights from Aluminum Colors Inc., of Indianapolis, the development work was much more vigorously carried forward, and the license holders received constant encouragement and counsel from the laboratories of the patent holders.

3. The Alumilite Treatment will be described in detail and I will divide it into five branches:-

A. Equipment
B. Racks
C. Rinsing
D. Color work
E. Sealing

A. EQUIPMENT

The first requirement is a lead lined tank with either jacket or coils, which may be used for heating or cooling. The tank should have at least 12″ greater depth and length than the largest load contemplated. Its width should be at least three times as wide as the depth of the largest article you plan to anodize.

The solution used in this tank will be sulfuric acid and water. Solution strength will depend on the application of treatment desired; whether for clear coatings of high durability; colored

coatings for decorative purposes, or flexible coatings to stand cold working. Current density will be 12-13 amp. per square foot. Voltage requirement will vary from 12 to 24 volts, dependent on solution concentration. Temperature of treatment solution will vary from 68° to 85°F. The cooling equipment should be adequate to hold this temperature with 200 watts per sq. ft. being dissipated. An air agitation pipe to provide uniform agitation is required. The generator should be 12-24 volt directly connected to its motor drive and of adequate amperage to provide 20 amperes per sq. ft. of contemplated work. You will notice that the generator should have 30% greater amperage than that required by the work, this is to allow for racks which also require current. The direct drive feature is recommended since great initial shock loads arise on introduction of work into the tank.

One cold water rinse tank of at least as great depth as the treatment tank and a hot water tank with a coil capable of maintaining 180°-210°F., and about the same dimensions as the treatment tank. This hot water tank should be of wood construction and the coil of rustless material.

Since hydrogen and air come from the treatment tank carrying sulfuric acid spray, exhaust equipment is necessary. A good thermometer, preferably with automatic temperature control equipment capable of maintaining the tank solution between 1°F plus or minus is necessary to the production of satisfactory work.

B. RACKS MUST BE ALUMINUM ONLY (Other materials dissolve)

Work being treated must maintain contact at the same point during treatment since an insulating layer is being formed and if contact is lost, even momentarily, no further contact can be established without stripping the rack. Much ingenuity is required in designing racks and with the exception that throwing power is no problem the design of racks holds much of the fascination of designing Chrome racks. The fact that an insulating layer is formed on the racks each time used makes it necessary to strip off all the layer plus a small amount of aluminum. Adequate allowance for this must be made in design.

Since certain aluminum alloys require higher voltage to get the same current density that can be obtained on 2S or pure aluminum, it has been found that 17S alloy is excellent for racks. To straighten out the ambiguity of this statement 17S at a potential

of 11.3 volts takes 12.6 amps. per sq. ft.; 2S at 11.2 volts takes 15.6 amps per sq. ft., hence in a rack constructed of 17S the current density on the rack is considerably reduced, a thinner layer is formed with less to strip off. 17S has very desirable spring properties which are used in holding work.

C. RINSING

Rinsing in clear running water is most important and the necessity of speedy washing out of any cavities cannot be overemphasized. Fabricated work with lapped or rolled joints or beaded edges present a very difficult problem. If it is not possible to secure the work prior to the closing of beads, the use of a hose for rinsing beads offers the only hope of successful work. The layer stands the treatment solution, but is rapidly dissolved by dilute acid. Inadequate rinsing is evidenced by fringes of pale stains or non-absorption of color or dyed work.

D. COLORED WORK

The oxide layer formed by the aluminite treatment when freshly rinsed from the treatment tank has the ability of absorbing organic dyes to take on almost any color, to absorb stains and fingerprints or oils, it may also absorb solutions of inorganic salts which on introduction of solution of reactive salts may precipitate colored pigments directly in the layer, for instance a fresh layer impregnated with lead acetate then potassium permanganate will precipitate and retain a brown inorganic pigment known as lead peroxide, incidentally a very bright-fast color. Similarly chrome yellow and Prussian blue may be formed in the layer. Organic dyes not completely mordanted by the oxide layer require additional treatment with a special sealer compound solution prior to the hot water seal.

E. SEALING

The fact that the coatings absorb material so readily is not always advantageous. For certain types of service such as cafeteria trays it is essential that food products coming in contact with the coating should not stain it. Bengston discovered that treatment with boiling water will effectively seal clear coatings and prevent them from staining or dyeing. Such a treatment as is shown by X-Ray examination changed the amorphous alumina

originally formed, in part at least, to the crystaline alpha monohydrate. Accompanying the change in the crystal structure is a marked increase in the corrosion resistance of the coating.

Edwards has shown that it is possible to further increase the corrosion resistance of the coatings by absorbing substances such as silicates or chromates in them. Specimens sealed in hot chromate solutions have withstood 52 weeks exposure to 20% salt spray.

The oxide layer in dry form is an excellent electrical insulator, the breakdown voltage is roughly proportional to the thickness of the layer.

Breakdown voltage of coating on commercially pure metal:

Thickness of Coatings, Inches	Breakdown Voltage
.0002	180
.0004	280
.0006	380
.001	420

These values may be increased as much as 50% by the sealing in hot water and if sealed by boiling in transformer oil or water the increase is even greater but unknown to me.

4. PROPERTIES OF COATINGS

2S commercial aluminum of 99.2% purity is the most commonly treated material and produces the most desirable coatings since the layer is relatively pure oxide. The word "relatively" is used, since pure aluminum oxide is colorless, but may be tinted either because of the presence of very minor impurities comprising iron, silicon, chromium, etc., as constituents of the metal, or because of absorbed substances coming from the electrolyte.

Coatings on commercial 2S aluminum sheet produced in the chromic acid process are greenish or grey. Coatings made in the sulfuric acid electrolyte are the brightest of all and when produced on clean aluminum of high purity are transparent with an almost porcelain-like glaze. This is one of the reasons the sulfuric acid process has become almost universal.

The natural colorless oxide film may be greatly affected by even minute quantities of alloying elements, or impurities. The anodic treatment dissolves some alloying elements which consequently have little effect on the color of the oxide coating.

Silicon present in commercially pure aluminum tends to produce a grey or brownish shade unless it is subsequently in solid solution or very well dispursed. Larger percentages of silicon will produce oxide coatings increasingly grey to black. Magnesium in small quantities seems to whiten the coating, but increased quantities tend to a darkening of the anodic coating. Chromium produces a lemon yellow tint to anodic coatings.

Welds should be made from rod of the same material as is being welded. Ordinary aluminum welding rod is high in silicon, and on anodizing welds are easily detected by the grey patch indicating the added metal. With alloy material welding even with rod of the same composition, often brings disappointing results. The local heat treatment often causes peculiar color effects adjacent to the weld. Close co-operation between the welder and the anodic finisher will save many hours of wrangling and worry.

Instead of a uniform structureless appearance an oxide coating may sometimes exhibit streaks often approaching some regular pattern. These streaks are usually undesirable, but ensuring their complete absence is extremely difficult since they result from structural characteristics or impurities in original ingot which persist in the rolled metal.

Satin finishing by compound impregnated wheel or by etching before anodic coating may be employed to reduce the appearance of streaking.

Some of the important applications of anodic coating are in the structural and architectural field. The anodic coating properly processed offers substantial protection against the weather. Smooth hard coatings minimize surface corrosion and if dirt and dust are removed by maintenance procedure the bright clean appearance of the surface can be maintained almost indefinitely.

One of the outstanding and most valuable characteristics of the anodic coating is its high abrasion resistance. It is its corundum like hardness that has made this coating so desirable on cafeteria trays, refrigerator trays, handrails and automobile pistons. The fact should be borne in mind that though the layer is very hard it is also very thin and is supported by a base metal much softer and less resistant to deformation. Because of the softer supporting material it is not difficult to scratch through even the hard layer with sharp pointed or edged instruments. However, for the

rubbing type of wear, the anodic coating gives excellent service. Anodic coating eliminates the tendency of aluminum cafeteria trays to smudge table linen or aluminum sink strainers or dish pans to mark porcelain or tile surfaces.

Coating crack when subjected to deformation and are subject to a crazing effect when exposed to high temperature. This crazing effect is probably caused by the difference in expansion co-efficients of the oxide layer and the base metal. However, the cracks in the coatings seem to have no reduction in the corrosion or abrasion resistance of the layer. There is no tendency to peel since the oxide is boned to the parent metal. This characteristic makes the coatings so desirable as primers for paint finishes. This same characteristic is utilized in the extremely clever process of plating on aluminum that was developed, I believe, in this very vicinity.

WING YOUR WAY TO DAYTON, THE BIRTHPLACE OF AVIATION

AN EXECUTIVE HAS NOTHING TO DO

As everybody knows . . . an executive has practically nothing to do . . . That is . . . excep: . . . to decide what is to be done . . . to tell somebody to do it . . . to listen to reasons why it should not be done . . . why it should be done by somebody else . . . or why it should be done in a different way . . . to prepare arguments in rebuttal that shall be convincing and conclusive . . .

To follow up to see if the thing has been done . . . to discover that it has not been done . . . to inquire why it has not been done . . . to listen to excuses from the person who should have done it . . . and did not do it . . . to follow up a second time to see if the thing has been done . . . to discover . . .

That is has been done but done incorrectly . . . to point out how it should have been done . . . to conclude that as long as it has been done . . . it may as well be left as it is . . . to wonder if it is not time to get rid of a person who cannot do a thing correctly . . . to reflect that the person in fault has a wife and seven children . . . and that certainly . . .

No other executive in the world would put up with him for another moment . . . and that . . . in all probability . . . any successor would be just as bad . . . and probably worse . . . to consider how much simpler and better the thing would have been done had he done it himself in the first place . . . to reflect sadly that if he had done it himself . . . he would have been able to do it right . .

In twenty minutes . . . but that as things turned out . . . he himself spent two days trying to find out why it was that it had taken somebody else three weeks to do it wrong . . . and then realized that such an idea would strike at the very foundation of the belief of all employees that . . .

AN EXECUTIVE HAS NOTHING TO DO
(*Reprinted, Courtesy, Advertising Age*)

WING YOUR WAY TO DAYTON, THE BIRTHPLACE OF AVIATION

Simple Methods of Plating Solution Analysis

Sent to Us by Paul A. Oldam, Chairman Educational Committee
Newark Branch

STANDARD SOLUTIONS NECESSARY

Half-Normal Hydrochloric acid made by diluting 41.5 cc. of HCl of sp. gr. 1.19 to 1 liter with distilled water.

Tenth-normal Sulfuric acid made by diluting 2.8 cc. of H_2SO_4 of sp. gr. 1.84 to 1 liter with distilled water.

.2 Normal Sodium Cyanide made by dissolving 9.80 grams of C.P. Sodium Cyanide in distilled water and diluting to one liter.

Tenth-Normal Sodium Thiosulfate = 24.82 grams per liter.
Half-normal sodium hydroxide = 20 grams per liter.
Potassium permanganate = 3.16 per liter.
Ammonium sulfocyanide = 22 grams per liter.
Oxalic acid = 6.30 grams per liter.
Potassium ferrocyanide = 21.63 grams per liter.
Silver nitrate = 17.00 grams per liter.
(These do not have to be standardized)

Reagent Solutions

10% potassium iodide made by dissolving 10 g. of KI in 100 cc. of distilled water.
Uranium Nitrate—dissolve 5 grams in 100 cc. of distilled water.
Methyl orange—.1 gram in 100 cc. of water.
Methyl red—.2 gram in 100 cc. of alcohol.
Phenolphthalein—1 gram in 100 cc. of alcohol.
Potassium chromate—10 grams per 100 cc. water.

NICKEL SOLUTION

Nickel content

1. Pipette a 1 cc. sample into a 250 cc. beaker.
2. Add 50 cc of distilled water.
3. Add 5 cc. of glacial acetic acid.
4. Add C.P. concentrated Ammonia drop by drop until solution turns blue and is alkaline to litmus paper.
5. Dilute to 150 cc with water.
6. Add a few drops of 10% KI solution.
7. Add 1cc. of tenth-normal silver nitrate solution.
8. Titrate with .2 Normal sodium cyanide until solution clears.
9. Add .1N silver nitrate until solution goes faintly cloudy again.
10. Add .2N sodium cyanide until solution just clears.
11. (cc. of NaCN — cc. of $AgNO_3$) × .375 equals oz. per gallon of metallic nickel.

Chloride content

1. Pipette a 1cc. sample into a 150 cc. beaker.
2. Add 100 cc. of water.
3. Add 10 drops of 10% potassium chromate sol.
4. Titrate with tenth-normal silver nitrate until buff color appears.
5. cc. of silver nitrate × .71 equals oz. per gallon of ammonium chloride.

Ammonia content

1. Pipette a 10 cc. sample into a 150 cc. beaker.
2. Add 100 cc. of water.
3. Add 10 drops of methyl red indicator.
4. Titrate with .1N sulfuric acid until yellow color just turns red.
5. CC of Sulfuric acid × 2.52 equals cc. of ammonia per gallon.

pH.

1. This can be taken on either a colorimetric set, an electrometric set or with pH. paper.

Boric acid content of Nickel solution

1. Pipette a 5 cc. sample of nickel solution into a 150 beaker.
2. Add enough mannite (Mannitol) to make a thick paste.
3. Add 10 drops of Brom cresol purple indicator solution.
4. Titrate with .1 Normal sodium hydroxide until purple color turns from yellow thru blue to purple.
5. CC of NaOH used × .166 equals oz. per gal. of boric acid.

Notes:

Brom cresol purple indicator is made by dissolving .04 grams in 50 cc. of alcohol.

Tenth-normal sodium hydroxide is made by dissolving 4.00 grams of C.P. sodium hydroxide in water and diluting to one liter.

CYANIDE COPPER SOLUTION
also Rochelle Salts Solution

Copper content

1. Pipette a 2½ cc. sample into a 250 beaker.
2. Add 5 cc. of C.P. conc. Nitric acid (under hood).
3. Boil for 2 to 3 minutes under hood to expel nitrous oxide and hydrocyanic acid fumes.
4. Add 25 cc. of water.
5. Add C.P. conc. Ammonia until solution turns dark blue indicating it is alkaline.
6. Heat to boiling and add conc. HCl. until solution just turns blue litmus red. Avoid an excess.
7. Dilute to 200 cc. with water.
8. Add 2 to 3 grams of KI and let dissolve.
9. Add a few cc. of a freshly made 1% soluble starch indicator solution.
10. Titrate with the Standard Sodium Thiosulfate solution to disappearance of black color. The black color should not reappear for at least one minute when the end-point is reached.
11. CC. of Thiosulfate used × .336 equals oz. per gallon of metallic copper.
12. oz. per gallon of metallic copper divided by .71 equals oz. per gallon of copper cyanide.

Free cyanide content

1. Pipette a 5 cc. sample into a 150 beaker.
2. Add 100 cc. of water.
3. Add a few drops of 10% KI solution.
4. Titrate with .1N silver nitrate until a slight cloud or turbidity appears.
5. CC of silver nitrate used × .262 equals oz. per gallon of free cyanide.

Rochelle salts content

1. Pipette a 5 cc. sample of copper solution into a 250 beaker.
2. Add 1 cc. of conc. HCl under a hood.
3. Boil under a hood taking care not to let volume get below 2 cc.
4. Add about 50 cc. of water and about 1 gram of C.P. zinc dust.
5. Stir for a minute or so and filter thru a # 1 Watman filter paper.
6. Wash ppt. into filter paper and wash the paper at least three times with warm water.
7. Reject the ppt. To the filtrate add 5 cc. of conc. sulfuric acid.
8. Add about a gram of C.P. manganous sulfate.
9. Heat solution to boiling.
10. Titrate with tenth-normal potassium permanganate until the appearance of a dark brown turbidity.
11. Add exactly 10.0 cc. of the tenth-normal Oxalic acid.
12. Heat to boiling.
13. Continue titration with tenth-normal permanganate until a pink color is produced which lasts one minute. If a straw brown color appears the end-point has been passed.
14. (CC of permanganate — CC of oxalic acid) × .125 equals oz. per gal. of Rochelle salts.

Carbonate content

1. Pipette a 5 cc. sample into a 250 beaker.
2. Add 150 cc. of water.
3. Heat to boiling.
4. Add 10 cc. of a 10% barium chloride solution.
5. Filter thru a #1 Watman filter paper. If any ppt. comes thru, run it thru the paper again.
6. Wash ppt. into filter paper and then wash the filter paper at least three times with hot water.
7. Transfer filter paper and ppt. back to beaker.
8. Add 150 cc. of water.
9. Add one cc. of methyl orange indicator sol. and titrate with Half-normal Hydrochloric acid until a permanent red color appears.
10. CC of Hydrochloric acid used × .706 equals oz per gallon of sodium carbonate.

pH Measurement

Use a colorimetric set or pH Paper.

ACID COPPER SOLUTION

Copper content

1. Pipette a 2½ cc. sample into a 250 beaker.
2. Add 25 cc. of water.
3. Add C.P. conc. Nh_4OH until solution turns dark blue indicating it is blue.
4. Heat to boiling and add conc. HCl until solution is just acid to litmus paper. Avoid adding an excess.
5. Dilute to 200 cc. with water.
6. Add 2 to 3 grams of KI and let dissolve.
7. Add a few cc. of freshly made 1% (1 gram to 100 cc. of water) soluble starch indicator.
8. Titrate with standard Sodium Thiosulfate solution to disappearance of black color. The black color should not reappear for at least one minute when the end-point is reached.
9. CC. of Standard Thiosulfate used × .336 equals oz. per gallon of metallic copper.

Acid content

1. Pipette a 2½ cc. sample into a 150 beaker.
2. Add 10 drops of methyl orange indicator.
3. Titrate with Half-normal Caustic soda Standard solution to disappearance of orange color and appearance of slight yellow color.
4. CC. of Standard Caustic Soda used × .694 equals oz. (fluid) sulfuric acid per gallon.

BRASS OR BRONZE SOLUTION

Metallic copper content

Proceed exactly as in the analysis of a cyanide copper solution.

Free cyanide content

Proceed exactly as in the analysis of a cyanide copper solution.

Carbonate content

Proceed exactly as in analysis of a cyanide copper solution.

Metallic zinc content

1. Pipette a 5 cc. sample into a 250 beaker.
2. Add 25 cc. of water and 1 to 2 grams of C.P. crystal sodium sulfide.
3. Heat to boiling and filter thru a #1 Watman filter paper. If ppt. comes thru paper at first, run thru the paper again.
4. Wash ppt. into filter paper and wash paper at least two times with hot water.
5. Transfer filter paper and ppt. back to the beaker.
6. Add 10 cc. of C.P. conc. HCl and a few Sodium sulfite crystals.
7. Boil to expel the H_2S.

8. Dilute to 150 cc. with water and heat to boiling.
9. Titrate with standard Potassium Ferrocyanide solution using Uranium nitrate as an outside indicator. The end-point is indicated when the addition of 1 drop of solution being titrated to two drops of uranium nitrate in the spot plate produces a reddish-brown ppt. This ppt. is more noticeable after standing several minutes.
10. CC. of Standard Potassium Ferrocyanide used × .133 equals oz. per gallon of Metallic Zinc.

pH Measurement

Use a Colorimetric set or pH Paper.

CADMIUM SOLUTION

Cadmium content

1. Pipette a 5 cc. sample into a 400 cc. beaker.
2. Cautiously add under a hood 10 cc. of C.P. conc. sulfuric acid.
3. Boil until solution comes a clear brown color.
4. Allow to cool and add 200 cc. of cold water.
6. Heat to boiling.
7. Titrate with standard Potassium Ferrocyanide solution using Uranium nitrate as an outside indicator in a spot plate. Put two drops of the uranium nitrate solution in each spot on the plate. Then add the standard Ferrocyanide to the solution being titrated one cc. at a time. After each cc. is added take a drop of the solution being titrated and add it to the Uranium nitrate on the spot. The end-point is indicated by the appearance of a reddish-brown ppt. This ppt. is more noticeable after standing several minutes.
8. CC. of Standard Ferrocyanide used × .327 equals oz. per gallon of Metallic cadmium.

Total cyanide content

1. Pipette a 5½ cc. sample into a 150 beaker.
2. Add 100 cc. of water.
3. Add 1 gram of C.P. caustic soda and dissolve.
4. Add a few drops of 10% KI solution.
5. Titrate with Standard Tenth Normal Silver Nitrate until a slight cloud is produced.
6. CC. of Silver nitrate used × .262 equals oz. per gallon of total cyanide.

Carbonate Content

Proceed exactly as in analysis of cyanide copper solution, using a 5 cc. sample.

Total alkali content—calculated as NaOH

1. Pipette a 5 cc. sample into a 250 beaker.
2. Add 100 cc. of water.
3. Add as much .1N silver nitrate as was used in total cyanide determination.
4. Add ten drops of phenolphthalein indicator.
5. Titrate with Standard Half-normal Hydrochloric acid until solution stays permanently white.
6. CC. of Standard HCl used × .534 equals oz. per gallon of total alkali.

Caustic soda content

The caustic soda content is obtained from the results of the total alkali and carbonate contents.

(CC. of HCl used in Total Alkali determination minus ½ the CC. of HCl used in carbonate determination) × .534 equals oz. per gallon of Caustic soda.

CYANIDE ZINC SOLUTION

Metallic zinc content

1. Proceed exactly as in the determination of Zinc in a Brass solution except that now a 1 cc. sample is used.

2. CC. of standard Potassium Ferrocyanide used × .665 equals oz. per gallon of Metallic Zinc.

Free Cyanide content

Proceed exactly as in the analysis of a cyanide copper solution.

Carbonate content

Proceed exactly as in the analysis of a cyanide copper solution.

Total alkali content

Proceed exactly as in the analysis of a Cadmium solution.

Caustic soda content

Proceed exactly as in the analysis of a Cadmium solution.

CHROMIUM SOLUTION

Chromic acid content

1. Pipette a 5 cc. sample into a 250 cc. volumetric flask, and dilute to proper mark with water.
2. Pipette a 5 cc. sample of this diluted solution into a 250 beaker.
3. Add 150 cc. of water.
4. Add 2 to 3 grams of C.P. Potassium Iodide and let dissolve.
5. Add 5 cc. of conc. sulfuric acid.
6. Titrate immediately with Tenth-Normal Sodium Thiosulfate to a lemon color.
7. Add a few cc. of a freshly prepared 1% soluble starch indicator solution.
8. Continue titration with the Thiosulfate until the black color disappears for at least one minute.
9. CC. of Standard Sodium Thiosulfate used × 4.44 equals oz. per gallon of chromic acid.

Iron and Trivalent Chromium contents

Use method outlined in "Principles of Electroplating and Electroforming" by Blum and Hogaboom.

Sulfate content

1. Pipette a 5 cc. sample into a 440 cc. beaker.
2. Dilute with 200 cc. of water.
3. Add 10 cc. of C.P. conc. HCl, and 10 cc. of ethyl alcohol, and 10 cc. of glacial Acetic acid.
4. Boil for ten minutes.
5. Add 10 cc. of 10% barium chloride solution and boil for several minutes more.
6. Place in warm sand bath for several hours or let stand over night.
7. Filter thru an ashless filter paper and wash filter paper and ppt. until the filtrate coming thru is no longer acid.
8. Ignite and weigh ppt.
9. Weight of ignited barium sulfate ppt. × 11.28 equals oz. per gallon of Sulfate as H_2SO_4.

SILVER SOLUTION

Metallic silver content

1. Pipette a 5 cc. sample into a 250 beaker.
2. Add 25 cc. of water and 1 to 2 grams of C.P. sodium sulfide crystals.
3. Heat to boiling and filter thru a #1 Watman filter paper.
4. Wash at least three times with hot water.
5. Return filter paper and ppt. to beaker.
6. Add 15 cc. of C.P. conc. Nitric acid.
7. Boil to dissolve the ppt. of silver sulfide.
8. Wash down sides of beaker and add several crystals of C.P. Ferric-ammonium sulfate.
9. Titrate with Standard Ammonium sulfocyanide to the appearance of a brick red color.

10. CC. of Standard Sulfocyanide used × .75 equals (TROY) oz. of Metallic Silver per gallon.

CYANIDE GOLD SOLUTION ANALYSIS

Metallic Gold Determination

1. Pipette 10 cc. sample of cyanide gold plating solution into a 250 cc. beaker.
2. Add 15 cc. Concentrated Hydrochloric Acid
3. Heat to expel poisonous cyanide fumes. (Caution, do not evaporate)
4. Add 150 cc. water.
5. Add 15 cc. of a 10% solution of Ferrous Sulphate (Fe_2SO_4:$7H_2O$).
6. Stir vigorously, and allow solution to stand three hours.
7. Filter through ashless filter paper and wash thoroughly with hot water.
8. Place filter paper with precipitate into a procelain crucible and ignite, over Bunsen Burner.
9. Allow Crucible to cool.
10. Weigh Crucible and contents.
11. Calculate the difference in weight of crucible without the filter paper.
12. The difference in weight as grams, multiplied by 244 equals pennyweight metallic gold per gallon.

For Free Sodium Cyanide Determination

Proceed same as for free cyanide in copper solution.

For Carbonate Content

Proceed same as for determination of carbonates in copper cyanide solution.

For pH

Use pH papers or colorimetric set.

RULES RELATIVE TO THE CIRCLE

To Find Circumference—

Multiply diameter by 3.1416.
Or divide diameter by 0.3183.

To Find Diameter—

Multiply circumference by 0.3183.
Or divide circumference by 3.1416.

To Find Radius—

Multiply circumference by 0.15915.
Or divide circumference by 6.28318.

To Find Side of an Inscribed Square—

Multiply diameter by 0.7071.
Or multiply circumference by 0.2251.
Or divide circumference by 4.4428.

To Find Side of a Square of Equal Area—

Multiply diameter by 0.8862.
Or divide diameter by 1.1284.
Or multiply circumference by 0.2821.
Or divide circumference by 3.545.

Square

A side multiplied by 1.4142 equals diameter of its circumscribing circle.
A side multiplied by 4.443 equals circumference of its circumscribing circle.
A side multiplied by 1.1284 equals diameter of a circle of equal area.
A side multiplied by 3.545 equals circumference of an equal circle.

To Find the Area of a Circle—

Multiply circumference by one-quarter of the diameter.
Or multiply the square of diameter by 0.7854.
Or multiply the square of circumference by 0.07958.
Or multiply the square of one-half diameter by 3.1416.

To Find the Area of an Ellipse—

Multiply the product of its axis by .7854.

Or multiply the product of its semi-axis by 3.14159.

Contents of cylinder = area of end × length.

Contents of wedge = area triangular base × altitude.

Surface of cylinder = length × circumference + area of both ends.

Surface of sphere = diameter squared × 3.1416, or = diameter × circumference.

Contents of sphere = diameter cubed × 0.5236.

Contents of pyramid or cone, right or oblique, regular or irregular = area of base × one-third altitude.

Area of triangle = base × one-half altitude.

Area of parallelogram = base × altitude.

Area of trapezoid = altitude × one-half the sum of parallel sides.

TO FIND THE CAPACITY OF A TANK IN GALLONS

First step (all measurements to be in inches):

For rectangular tanks, multiply the length by the width, by the depth.

For cylindrical tanks, multiply the length by the square of the diameter, by .7854.

For elliptical section tanks, multiply the length by the short diameter, by the long diameter, by .0339.

Second step:

Divide the result by 231, which is the number of cubic inches in one gallon; the answer is the capacity of the tank in gallons.

CONVERSION FACTORS—METRIC AND U. S. UNITS

1. Grams per liter (g./l.) multiplied by 0.134 equals avoirdupois ounces per gallon (oz./gal.).
2. Avoirdupois ounces per gallon (oz./gal.) multiplied by 7.5 equals grams per liter (g./l.).
3. Grams per liter (g./l.) multiplied by 0.122 equals troy ounces per gallon (tr.oz./gal.).
4. Troy ounces per gallon (tr.oz./gal.) multiplied by 8.2 equals grams per liter (g./l.).
5. Grams per liter (g.l.) multiplied by 2.44 equals pennyweights per gallon (dwt./gal.).
6. Pennyweights per gallon (dwt./gal.) multiplied by 0.41 equals grams per liter (g./l.).
7. Amperes per square decimeter (amp./dm.^{2}) multiplied by 9.29 equals amperes per square foot (amp./sq.ft.).
8. Amperes per square foot (amp./sq.ft.) multiplied by 0.108 equals amperes per square decimeter (amp./dm.^{2}).
9. Cubic centimeters per liter (cc./l.) multiplied by 0.128 equals fluid ounces per gallon (fl.oz./gal.).
10. Fluid ounces per gallon (fl.oz./gal.) multiplied by 7.8 equals cubic centimeters per liter (cc./l.).
11. Weight of any solution per cubic foot equals specific gravity (sp.g.) multiplied by 62.426.
12. Weight of any solution per gallon equals specific gravity (sp.g.) multiplied by 8.337.
13. Degrees Centigrade × 1.8 plus 32 equals degrees Fahrenheit.
14. $\dfrac{\text{Degrees Fahrenheit} - 32}{1.8} = \text{degrees Centigrade.}$

ELECTRICAL UNITS

The electrical units are as follows:

VOLT—The unit of electrical motive force. Force required to send one ampere of current through one ohm of resistance.

OHM—Unit of resistance. The resistance offered to the passage of one ampere, when impelled by one volt.

AMPERE—Unit of current. The current which one volt can send through a resistance of one ohm.

COULOMB—Unit of quantity. Quantity of current which impelled by one volt would pass through one ohm in one second.

FARAD—Unit of capacity. A conductor or condenser which will hold one coulomb under the pressure of one volt.

JOULE—Unit of work. The work done by one watt in one second.

WATT, the unit of electrical energy, and is the product of the ampere and volt. That is, one ampere of current flowing under a pressure of one volt gives one watt of energy.

One electrical horse power is equal to 746 watts.

One kilowatt is equal to 1000 watts.

To find the watts consumed in a given electrical circuit such as a lamp, multiply the volts by the amperes.

To ascertain the horse power used in driving a machine by electric motor—

$$\frac{\text{Amperes} \times \text{Volts}}{746} = \text{Horse Power}$$

To find the volts—divide the watts by the amperes.

To find the amperes—divide the watts by the volts.

To find the amperes of a given circuit, of which the volts and ohms resistance are known—divide the volts by the ohms.

To find the volts, when the amperes and the watts are known, multiply the amperes by the ohms.

To find the resistance in ohms, when the volts and amperes are known—divide the volts by the amperes.

TO REPLENISH METAL CONTENT IN PLATING SOLUTIONS

If it has been found in practice that 3.0 ounces of metallic nickel is the necessary amount to operate the solution satisfactorily, and upon the determination of the metallic nickel content it has been found that the solution contains 2.5 ounces metallic nickel, it will then be necessary to add to each gallon that the tank contains the difference between 3.0 and 2.5 which is 0.5.

If the tank contains 200 gallon of solution, then it will be necessary to add 200 times 0.5 equals 100 metallic ounces of nickel to be added to the solution.

All plating salts have a metallic percentage value, in the case of single nickel salts, ($NiSO_47H_2O$) there is 21% metallic nickel. Taking the pound as 16 ounces multiplied by 21% it equals and represents 3.36 ounces of metallic nickel in one pound of single nickel salts. Therefore the total ounces of metallic nickel to be added to the solution, which is 100 divided by 3.36 equals approximately 30 pounds single nickel salts is to be added to the solution to increase the metallic nickle content to the desired standard of 3.0 ounces per gallon.

Example:

Amount to be added to each gallon, times volume of solution equals total metal ounces, total ounces divided by 3.3 equals pounds to be added to solution.

In the case of cyanide plating solutions it will be necessary to add with the metal salt sufficient sodium cyanide to form the double metallic cyanides with an excess for "free cyanide". For example it requires 1.2 pounds to dissolve one pound of copper cyanide.

FARADAY'S LAW

Faraday, years ago, derived certain values which today form the basis of practically all electro-chemical work. Briefly stated, his observations were: "The amount of deposit is proportional to the current, to the time and to its chemical equivalent". Chemical equivalents are the amounts of the elements which will replace or combine with a unit weight of hydrogen. It is necessary therefore to know this important factor before definite values for the deposition of a metal can be given. Further, the rate of deposition of a metal depends on the valence and the atomic weight. In all cases the atomic weight remains constant, whereas the valence may vary. For example, the atomic weight of gold is 197.20, but the valence may be one or three.

In establishing the values for the electro-chemical equivalents, silver was selected because of certain advantages which it possesses. The electrolyte usually employed is the nitrate, being represented chemically by the formula $AgNO_3$. Silver is monovalent and is commonly used as the basis on which the electro-chemical equivalents of the other metals are derived.

The amount of silver deposited by the passage of an electric current of one ampere for a period of one second has been accurately determined to be 0.00111800 grams. This figure divided into 107.88, the internationally accepted value for the atomic weight of silver, gives a product of approximately 96500 coulombs. The coulomb being a unit of electric quantity, 96500 is therefore the commonly accepted standard and is called a Faraday.

Now the chemical equivalent of an element in the divalent form is just one-half that of the same element in the monovalent form. This being true, it is only necessary to know the valence and the atomic weight to proceed with the derivation of the electrochemical equivalent of another element. Take, for example, copper, with a valence of one or two.

The atomic weight of copper is approximately 63.6

The chemical equivalent of the monovalent form is 63.6 and of the divalent 31.8. If each of these figures be divided by 96500, it will be found that the quotients are respectively 0.000659 and 0.000329. These figures represent the amount of copper in grams for a valence of 1 and 2, deposited by the passage of a current of one ampere for a period of one second.

The following is a list of the metals for which deposition values have been calculated. For convenience, the atomic weight, specific gravity, valence, electro-chemical equivalent, and grams per ampere hour are shown:

	Element	Specific Gravity	Atomic Weight O = 16	Valence	Electro-chem. Equiv. Grams Per Amp.-sec.	Grams Dep. Per Amp.-hr.
1	Antimony	6.7	120.2	3	.000415	1.495
1	Lead	11.4	207.2	2	.00107	3.865
2	Cadmium	8.60	112.4	2	.000582	2.097
3	Copper(ous)	8.90	63.57	1	.000659	2.372
4	Copper(ic)	8.90	63.57	2	.000329	1.186
5	Gold(ous)	19.3	197.2	1	.00204	7.357
6	Gold(ic)	19.3	197.2	3	.000681	2.452
7	Iron	7.80	55.84	2	.000289	1.042
8	Nickel	8.8	58.68	2	.000304	1.095
8	Cobalt	8.72	58.97	2	.000305	1.100
9	Silver	10.5	107.88	1	.001118	4.025
10	Tin	7.3	118.7	2	.000615	2.214
11	Zinc	6.90	65.37	2	.000339	1.220

Mr. Lewis Smith
and Family,
Troy, Ohio.

Whereas:

Following a long period of ill health and suffering, extending over the past two years, an All Wise Providence has on October 24th, 1939, removed from this life Mrs. Lewis Smith, the wife of Lewis Smith, one of the members of the Dayton Branch, A.E.S. — And

Whereas:

Such a protracted illness of a wife and mother is always a period of distress and anxiety to the husband and children who are deprived of the loving care and affection of the wife and mother. Therefore, be it

Resolved:

That the members of the Dayton Branch, A.E.S., take this opportunity and this means of expressing to the bereaved husband, family, and relatives, our sincere condolence and sympathy in their grief and sorrow over the loss of a beloved wife and mother. And may the Great Father of us all sustain and comfort you at this time and hold her in His keeping 'till you meet again.

Corliss W. Powell
E. N. Cochran
W. Fraine

TO ALL BRANCH SECRETARIES AND LIBRARIANS

We are pleased to notice that so many fine papers are being read at Branch meetings. Why not send them to us for publication in the REVIEW. We need papers, all we can get. By publishing these papers in the REVIEW, you share your information with others.

Please cooperate with us by granting our request.

W. J. R. KENNEDY

MILWAUKEE BRANCH

At our November 2 meeting, a change important to our members was made. In December our meeting will be held at our regular place, the Republican Hotel, at the regular time 8 P. M. But on the THIRD FRIDAY instead of the first Thursday. Beginning in January, our meetings will be on the FIRST FRIDAY of each month. This change is made to enable our out of town members to attend meetings more regularly and with less hardship.

We were to have a paper on Polishing, but our speaker was unable to come. Our Librarian assures us that he will be here for our December meeting.

A letter was received from the Dayton Branch urging us to submit papers for the 1940 Convention, either as individuals or from the Branch. If you have any thoughts along this line, better get busy.

We were all pleasantly surprised to have Robert Goodsell from Dubuque walk in on us. 190 miles to attend meeting ought to be some kind of a record.

After the meeting, Jack and Bill Geissman, new Grandpa and Papa respectively furnished the refreshments (Milwaukee style). Al Hermansen was also accepting congratulations.

Don't forget-DECEMBER MEETING-THIRD FRIDAY, the 15th.

DEXTER F. RHODES, *Sec'y.*

New Coating Offers Unusual Corrosion Resistance

Reprinted from Oct. 23, 1939 issue of STEEL

Several well-known processes are combined to produce a new type of metallic coating which already has exhibited remarkable corrosion resisting properties in such severe applications as on oil well sucker rods in wells pumping highly corrosive hydrogen sulphide and salt solutions.

Developed by Standard Steel Spring Co., Coraopolis, Pa., a new metallic pore-free coating called Corronite appears to offer important advantages in improved corrosion resistance.

Extraordinarily thin coatings produced by the Corronizing process have been found to give extremely effective protection against corrosion of the most severe type. The bond of the Corronite to the steel is so firm and the ductility of the coating so high that bending or forming does not impair the protective value of the coating.

In this new process, the metals making up the coating can be applied in many ways. The composition of the coating, too, can be controlled so closely that coatings varying in thickness and properties can be provided to fit the service conditions to be encountered. Corronite coatings having a thickness of only 0.0004 inch showed exceptionally high corrosion resistance in accelerated tests. Cost of producing the coating is comparable with that of conventional coatings.

This new coating appears to have widespread application in many fields. As a metallic protection to ordinary low-carbon steels, it permits their use in all types of fabrications exposed to weather as well as to corrosive action of acid vapors and various solutions. As a low-cost, highly protective coating, the material is expected to find wide application by railroads, fabricators, shipbuilders, automobile manufacturers and in other industries

where corrosion problems are encountered. The coating may be designed to give exactly the protection required in each case.

Development of the Corronizing process and the Corronite coating it produces resulted from search for a method of protecting oil well sucker rods from the exceptionally severe corrosion of hydrogen sulphide and salt water present in some oil wells. After much research work, the Corronite coating was developed. On these highly corrosive "sour" well applications, it has extended equipment life far beyond that previously available. Life of ordinary sucker rods has been prolonged from five to ten times by use of the Corronite coating.

In standard salt spray tests, Corronized sucker rods have withstood 10,000 hours without showing any sign of failure.

Already the new coating has been applied to many products. In manufacture of steel containers, Corronized sheets have been subjected to deep-drawing operations without reducing the protective properties of the coating. Corronized steel sheets drawn into half barrels and given standard salt spray tests showed no tendency to corrode after 1500 hours on test.

Another important advantage of the new coating is that objects may be welded without reducing the corrosion-resistant properties of the coating. For instance, the half barrels mentioned above when welded and subjected to salt spray tests revealed no corrosion at the weld or in the zone near the weld, even after prolonged tests.

Youngstown Sheet & Tube Co., Youngstown, O., has conducted experiments in production of butt-welded tubing from Corronized material. Skelp with the coating on one side was welded exactly as regular uncoated skelp. Micrographs of the welds produced showed the coating intact over the weld. By this method it thus becomes possible to produce tubing with the corrosion proof coating either on the inside, or outside, or on both sides.

A factor that is holding back the expansion of sheet steel in

many new applications, as well as enlarging many present ones, is the corrosion factor. If the new coating proves actually as effective as it now appears to be, there no doubt will be a rapidly expanding market for low-carbon steel since the added protection will permit use where corrosion heretofore prevented it.

It has been estimated by Sir Robert Hadfield, the eminent British metallurgist, that 67,000,000 tons of iron and steel—or roughly $3,000,000,000—was the toll exacted yearly by rust and corrosion. The annual cost of corrosion in the United States alone has been estimated by Dr. F. N. Speller to be almost $1,000,000,000, considering all factors.

Already the results of applications and tests have aroused so much interest that Corronizing process licenses have been granted to Youngstown Sheet & Tube, Youngstown, O., Carnegie-Illinois Steel Corp., Carnegie-Illinois building, Pittsburg; Republic Steel Corp., Republic building, Cleveland; and Sears Roebuck & Co., 925 South Homan avenue, Chicago. It is understood the process can be applied by any well equipped electroplating department. Also, it is reported that the licensing agreements are most liberal.

Mr. N. E. Promisel, International Silver Co. Meriden, Conn., sends us the following interesting article taken from the *British Metal Industry*, May 1914.

"The majority of the plating rooms among the manufacturers are placed in one corner of the building without regard to arrangement for natural light or convenience. It seems to be the prevailing idea that the plating department is one of the simplest things to operate in the entire factory when the fact is it is one of the most complex problems with which scientists have to deal. The machinist can see his work at any moment and can avoid failure to follow drawings by being careful; and he need not be such a highly skilled mechanic either to read a drawing and operate a lathe. But the plater must cope with a great number of complex conditions and chemicals, very often the reaction of one chemical undoing work done by another".

"The plating industry is yet young and until a few years ago it was very little understood. Finishes were to be had, to be sure, but they were obtained by various methods which were mostly guesswork and could not be relied upon for uniformity in results. The plater of twenty years ago was usually a man who had laid hold of a few "receipts" for making solutions, etc. and had worked for a while under someone else. He had no knowledge of the chemical end of the plating trade, depending upon his guess as to what was best to be done in meeting conditions which arose. Today, through the information of trade journals, text-books and the educational methods of the American Electroplaters' Society, the plater is being transformed and trained until he has become quite as efficient and as important as any of the foremen in the shop". —— From an article entitled "Modern Plating Equipment and Supplies" in *THE METAL INDUSTRY* for May, 1914.

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Boston Branch met Thursday, Nov. 2nd, at the Manger Hotel, Boston with President DeLorme in the chair.

Minutes of the previous meeting read and approved, communications read placed on file, bills read and moved they be paid.

One application was read for the first time and turned over to the board of managers for approval, Everett R. Ryan, 29 Pine St., Greenwood, Mass., Associate, and one approved by the board of managers and elected to membership, Leonard A. Chesworth, 58 Bow Street, Somerville, Mass.

The committee for the annual banquet will be appointed at the next meeting as we had a speaker for the evening.

There being no other business the chair was turned over to the librarian Ed. Jevelli, who had as the speaker, Ralph McChan, of the E. I. duPont Co. Mr. McChan's subject was "Moly-black Finishes", a new Nickel Molydenum Black Electroplated finish.

Mr. McChan explained how this finish was first started and then showed samples of this finish on different pieces of metal and said that this could be done on zinc die castings, aluminum, or on plated work such as zinc, cadmium, hot-dipped tin, gray nickel plate, and iron or steel. It has a great resistance of rust withstanding a salt spray of more than one hundred hours, and a high rate of deposition at a low current it deposits twenty times as fast as nickel .001 in ten minutes. He answered all questions and they were plentiful.

He also spoke on the new Hull cell and this was very interesting. He gave a demonstration and it should be a great help to the plating industry.

There was a discussion for more than an hour and then a rising vote of thanks for his interesting talk.

Meeting adjourned at 11 P. M.

A. W. GARRETT, *Sec.*

Hartford Branch of the A.E.S., held its regular monthly meeting on Monday evening, October 16, 1939 at the Hotel Garde, Hartford, Conn.

The meeting was called to order at 8:15 P. M. with President Backus in the chair. Minutes of the previous meeting were read and accepted. No communications were received. One bill for our second quarter Per Capita Tax was voted paid.

One applicant, Mr. Kenneth P. Bellinger was elected to associate membership. One application for associate membership, from Mr. John G. Poor, of the Underwood-Elliott-Fisher Co., of Hartford was voted to take the usual course.

Mr. Bellinger, our newly elected associate member was speaker for the evening. He gave a very interesting talk on "Silicates and Their Applications to Metal Cleaning".

A general discussion followed, lead by Mr. N. Promisel. A short talk on "Black Nickel", followed which every one took part in.

In conclusion, Mr. Bellinger was given a rising vote of thanks.

The meeting was attended by twenty-five and was adjourned at 10:30 P. M.

V. E. GRANT, *Sec'y.*

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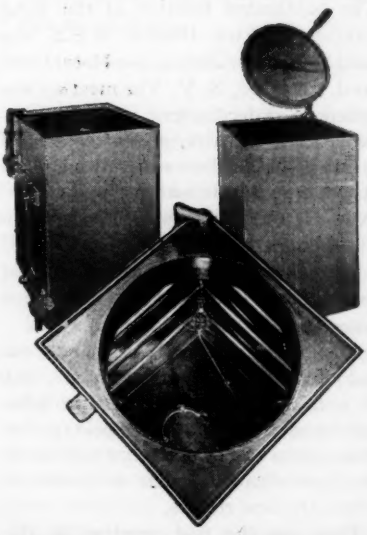

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New York Branch regular meeting was held on Friday evening, October 13. There was a large attendance, including many visitors. After routine business was transacted Dr. C. B. F. Young, Branch Librarian introduced Mr. A. B. Wilson, Chairman of the Research Committee of the A.E.S. Mr. Wilson touched on several very interesting phases of the work being done at the Chevrolet plant in Detroit, and illustrated his address with several reels of motion pictures. These showed copper, nickel and chrome parts being plated in mass production. Inspection of finished parts and laboratory tests were also included in the pictures.

Mr. Wilson was given a big hand at the close of his address.

F. J. MacStoker, *Sec'y.*

Binghamton-Syracuse Branch. The September meeting of the Binghamton-Syracuse Branch, A.E.S, was held September 29th at the Hotel Cortland, Cortland, N. Y. The meeting was called to order by our worthy President, Jack Harnett, and after a brief open discussion between the members of the branch, the meeting was turned over to our Librarian, Mr. Austin Fletcher.

Mr. Fletcher introduced as guest speaker, Mr. George Merz of the Harshaw Chemical Co., Cleveland, Ohio.

Mr. Merz choose as his topic "Control of Bright Nickel Solutions", but he went farther than control of solution by emphasizing the importance of good grades of base metal as well as an adequate cleaning cycle in order to obtain the best results.

This was the first meeting of the season and we were glad to see the old gang as well as some new faces. However, we missed our secretary, but hope he has the books balanced after receiving our expense account.

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Hope to see you at the next meeting, George.

F. W. Kenyon

Newark Branch. The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, October 6, 1939 at the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:30 P. M. with President John Kotches presiding. All other officers were present.

The minutes of the previous meeting were read and approved.

An invoice for Per Capita Tax in the amount of $71.55 was voted to be paid.

Applications for Mr. Robert Wallace Smith and Mr. James MacDonald Smith of the K. K. A. P. Munning Co., of Kobe, Japan to Associate Membership were voted to take the regular course.

Mr. Carl C. Greiner of Western Electric Co., and Mr. John E. Yarmack of International Telephone Development Co., were then elected to Associate Membership.

Under Committee reports, Mr. Horace Smith announced that the Ladies Auxiliary would hold their first meeting on Friday evening, October 20th, 8 P. M. at the Hotel Douglas. He urged all the members to persuade their wives and daughters to join the Auxiliary. He next announced that the arrangements for the scheduled jamboree by the Convention Committee were completed. He asked all the members to please send in their return postal cards, which the Secretary had mailed to each and every member, in order to make the proper reservations.

Mr. George Wagner next reported on the PICNIC. He stated that 67 Adults and 5 Children attended and that only 25 of this number were members of our Branch. All those who attended had a wonderful time. It was a beautiful day, with plenty to eat and drink, all sorts of games and no fights.

Our speaker for the evening, Mr. Ralph E. Petit of the Aluminum Company of America was next presented by Mr. Robert Sizelove. His subject was "Alcoa Aluminum and its Finishes". His talk was very interesting and was accompanied by moving picture films and stereoptican views. Mr. Petit showed us Aluminum from the ore to the finished product. He also exhibited numerous samples in all the different polished and Electroplated finishes of today. Mr. Petit was given a rising vote of thanks by the 54 members who attended.

Meeting adjourned at 11 P. M.

GEORGE WAGNER, *Sec'y.*

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Cincinnati Branch. The regular monthly meeting of the Cincinnati Branch of American Electroplaters Society, was held Thursday evening, October 26th, 1939, at 8:00 P. M. in the Hotel Metropole.

The minutes of the previous meeting were approved as read.

The Secretary was requested to write the New Jersey Zinc company and ask for twelve more copies of the latest bulletin on the "Finishing of Zinc".

A motion was made and seconded that the secretary invite the members of the Dayton Branch to one of our future meetings.

A letter from Mr. Chester Bethke pertaining to wage scales for platers and polishers in Cincinnati was ordered filed.

A letter from H. C. Luechauer, Chairman of the Educational program for the 1940 Convention requesting

papers for the coming convention was referred to the Board of Managers.

The remainder of the evening was taken up by discussion after which the meeting was adjourned.

MARTIN GANNON, JR., *Rec. Sec'y.*

Binghamton-Syracuse Branch. The October meeting of the Binghamton-Syracuse Branch A.E.S., was held at the Cortland Hotel, Cortland, New York, October 27. In the absence of our President Mr. Jack Harnett, our Vice President, Mr. Floyd Kenyon presided.

The speaker of the evening was Mr. Frank Mesle of the well known Community Plate Ltd., Oneida, N. Y., who reviewed the paper he gave at the Asbury Convention, "Adhesion of Electrodeposits". In this paper one of the most important phases of electrodeposition has been very thoroughly studied and the conclusions are sometimes quite confusing to say the least.

For instance, Mr. Mesle's experiments seem to clearly indicate that a smooth finish on the metal previous to plating is more apt to have a more adherent deposit whereas our English friend, Hothersall in his exhaustive tests at Woolwich, states that removing the surface layers of the steel by Anodic etching prior to plating gave the most adherent deposits. The effect of heat and aging on adhesion is quite definitely established by Mr. Mesle's very ingenious "can opener tester". I would like to suggest the same instrument can be used for a brittleness test, the much publicized ductileness of Bright Ni. does not look very ductile when subjected to this very efficient little gadget. I recommend it to all Bright Ni. platers. The three or four hundred pieces Mr. Mesle took the trouble to bring along with him were very interesting.

This Branch appreciates very much the fine meeting Mr. Mesle made possible. He drove about 150 miles on a nasty night and it is the hope of this Secretary that Mrs. Mesle did finally show up.

On account of the holidays in November and December it was decided to hold one meeting for the two months, this to be held in Cortland, Dec. 8. A speaker will be obtained and it is hoped this date is far enough away from the holidays to suit everyone concerned. A new technique in the collection of delinquent dues was employed and proved to be quite successful, (howdy Bill, Herb, and Larry).

Meeting adjourned at 10:45 P.M.

GEORGE SIMMONS, *Sec'y.*

Los Angeles Branch of the A.E.S. held their regular monthly meeting October 11, 1939, at the Rosslyn Hotel.

Meeting was called to order at 8 P. M. President Ray Bray presided.

Minutes and Financial report of previous meeting were read and accepted. Bills were read and ordered paid.

Mr. D. N. Eldred read a paper on the new Moly Black solution; keen interest was shown in samples plated in this solution.

Welcomed visitors to this meeting were Mr. Cadwallder of the H. J. Lynch Co., Mr. Fred A. Herr of Metal Industry and Mr. Miller of Houston, Texas.

Mr. McLaren who as head of the Whoopie Committee, and who arranged our picnic so successfully, is preparing a good time for the boys after the business session. He will be assisted by Mr. Vensel and Mr. Coffin.

The following questions were in the Question Box:-

Q. What is necessary to remove the oxide coating on sheet aluminum that has been anodized?

A. Dip in boiling Caustic solution for ½ minute, rinse, then dip in 20%

Nitric Acid solution or Standard Bright dip.

Q. In polishing steel parts with wheels set up with cement, small pit marks show up. These, however, are not present if glue wheels are used. What is the cause?

A. The only answer offered was to try finer grade emery.

Q. If by chance a cleaning tank should boil dry, will the cleaning properties of the remaining salt be destroyed?

A. Safest thing is to make a new cleaning solution.

Meeting adjourned at 10:30 P. M.

RAYMOND SOLIVAN, *Sec.*

Newark Branch. The regular meeting of the Newark Branch, A.E.S. was held on Friday evening, October 20th, 1939 at the Club Room of the Hotel Douglas, Newark, N. J.

The meeting was called to order at 8:30 P. M. with President John Kotches presiding. Other officers present were George Wagner, Sec'y; Nelson Sievering, Treasurer; Paul A. Oldam, Librarian; George Reuter, Harmon S. Hunt and William Harrison, Trustees.

The minutes of the previous meeting were read and approved.

A communication from Mr. Luechauer, Chairman of the Educational Program for the Dayton Convention was read and turned over to our Librarian.

A letter from Mr. Chester G. Bethke from Washington, D. C., was read and after some discussion it was voted to place same on file.

Application for Mr. Donald A. D'Elia of the Four Plating Co., to active membership was voted to take the regular course.

Mr. Horace Smith announced that the Convention Committee was discharged with thanks by our President at our Jamboree which was held on October 14th. He stated that the affair was attended by about 145 persons and that everyone had a wonderful time.

Mr. George Wagner, Chairman of the 1940 Banquet Committee, announced that a committee meeting of the Newark and New York Branches will be held on Friday evening, November 3rd, at the Hotel Douglas at 7 P. M.

Our Guest Speaker for the evening was Mr. J. Mann of N. Ransohoff, Inc. He was presented by Mr. George Reuter, Acting Librarian. Mr. Mann gave us a most interesting talk on "Ball Burnishing". His talk was accompanied by stereoptican views showing a large variety of tumbling and burnishing barrels. Mr. Mann was given a rising vote of thanks by the 41 members who attended.

Meeting adjourned at 10:15 P. M.

GEORGE WAGNER, *Sec'y.*

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0.9—1.5 (copper, etc.)	11.0—13.5 (Cadmium, zinc, tin and cleaners)

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PAUL FRANK

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A Ladies Auxiliary of the Newark Branch of the American Electroplaters' Society was organized on Friday evening, October 20, 1939 at the Hotel Douglas, Newark, N. J. Upon motion duly made and seconded it was voted that the officers of the Convention Committee should be elected as the first officers of the Auxiliary for the present fiscal year ending April 30, 1940.

Following are the names of the officers: Mrs. Horace H. Smith, President; Mrs. George Wagner, Secretary and Mrs. Nelson F. Sievering, Treasurer. About 35 ladies attended. Wives and daughters of the members of the American Electroplaters' Society are eligible to membership.

MRS. GEORGE WAGNER, *Sec'y.*

New Haven Branch. The first meeting of the metallurgy class was held Tuesday, October 24, at the Sterling Chemistry Laboratory of Yale University. Some 70 men from all over the state signed up for the course. At this meeting Mr. L. W. Thelin, metallurgist at the Chase Brass & Copper Co., reviewed briefly the outline of the course, and explained the numerous attendant features that would be included. It is planned to have a series of 14 lectures, which are to be held bimonthly. Following is a subject-matter outline of these lectures:

1. Introduction:
   - Part 1 — Ore Metallurgy
     - a. Iron & Steel
     - b. Copper
   - Part 2 — Metals & Alloys
     - a. Fundamental Considerations
     - b. Microscopy
2. Alloy Systems
   - a. Constitution Diagrams
   - b. Characteristics
3. Properties of Metals:
   - a. Chemical Testing
   - b. Physical Testing
4. Casting Shop Practice
5. Rolling Mill Practice
6. Grain Growth & Recrystallization
7. Tube Mill Practice
8. Copper & Copper Alloys
9. Finishing Brass & Copper Alloys
10. Nickel & Nickel Alloys
11. Iron & Steel Alloys
12. Aluminum Alloys
13. Fabricating Brass Goods
14. New Developments in Non Ferrous Metallurgy

At this organization meeting, Mr. Tom Chamberlain gave a talk on the history and purposes of the American Electroplaters' Society, and also explained details about the course, and

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mentioned the types of men to whom it would be useful.

It was decided to continue the "Shop Problems" discussions after each of the lectures.

The large turn-out for this organization meeting was indeed gratifying, and presaged a banner year.

JOE SULLIVAN
Chairman of Educational Com.
New Haven Branch A.E.S.

Rochester Branch held its regular monthly meeting on Friday night October 20 at the Seneca Hotel. We had as guest speaker Mr. Edward Rinker, Chief Chemist for the Oakite Products Corp., his topic being "Cleaning of Steel Preparatory to Electroplating", a topic of very vital interest to everyone. He discussed the different types of cleaners and the various materials used as additions such as resins and various wetting agents. The use of reverse current for cleaning was discussed and he advised its use on steel but cautioned the use of it on other metals as liable to stain and or/pit. He brought out the fact that the degreaser had its place in the plating room but advised against its use on steel before plating because it removes the oils and greases but leaves a light film of finely divided dust or metals on the steel which seems to adhere so strongly as to be impossible of removal in either a soak or electric cleaner.

After the talk Mr. Rinker was besieged with questions.

Mr. Del Rosso — *You said that degreasing leaves metal particles on steel, isn't this because of magnetism set up during polishing?*

Mr. Rinker — Yes, you are unable to remove this film because of electrical attraction of small particles.

Mr. LoPresti — *Would you advise the use of two (2) separate tanks for reverse and direct current cleaning?*

Mr. Rinker — If possible it would be much better to use two tanks.

Mr. Desmond — *Isn't it true that the statement is made that it is possible to plate directly after degreasing?*

Mr. Rinker — Theoretically that is correct. Actually it is not advisable or practical because of smut which is of a fine nature and absorbs oils which stay on the metal.

Mr. Elster — *Would you advise the use of reverse current on the nickel-copper alloys such as German silver?*

Mr. Rinker — No; because of liability of pitting.

Mr. Tucker — *Would you care to discuss wetting agents used in cleaners?*

Mr. Rinker — Not at liberty to discuss, but will say some are stable in acid solution, few in alkali.

Mr. Rinker — Mr. Del Rosso has

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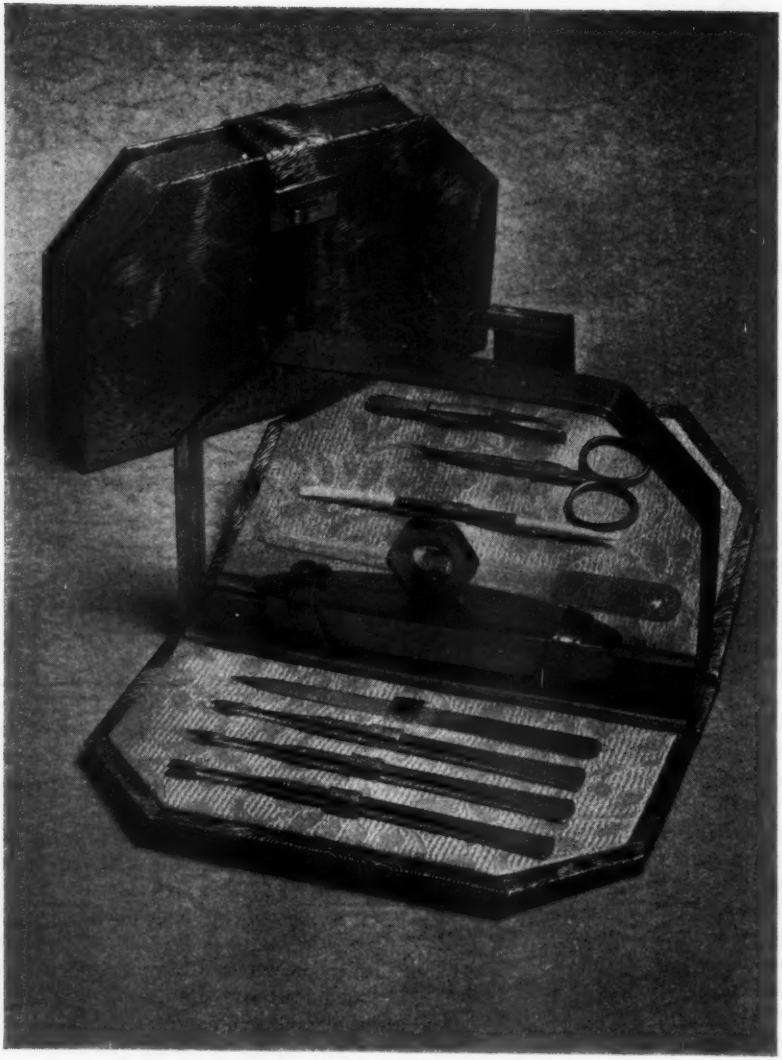

Barbara Bates

MANICURE SETS

THE LEA METHOD

has much to do with giving these articles an attractive finish at low cost

The Lea Method is used on the implements themselves and on parts of the box containing them. The implements, made of steel, are polished with Lea Compound (a patented type of greaseless buffing composition) in preparation for gold plating. All brass parts, including the box frame and the top of the buffer, are cut down with Learok (the buffing bar with "no free grease").

Here's an excellent example of a manufacturer making use of these two clean, fast-working, special compositions for producing the desired finish on an article. Each serves a useful purpose. Each fits into the LEA METHOD of Finishing which lowers costs by reducing the number of operations.

There is no limit to the versatility of the LEA METHOD OF FINISHING.

THE LEA MANUFACTURING CO.
Waterbury Conn.

Specialists in the Production of Clean-Working Buffing and Polishing Compounds

had quite some experience with cleaning with reverse current.

Mr. Del Rosso — Yes we use it on practically all our cleaning, even on brass because it takes off that thin film of loose metal and gives us a true metal base to plate on.

After these questions a rising vote of thanks was given Mr. Rinker for a very instructive evening. The meeting was then declared adjourned.

JUDSON R. ELSTER, *Sec'y.*

Toledo Branch. Minutes of the October 5th meeting held in room 224 of the vocational high school. The meeting was called to order by the President Victor Miner.

Minutes of the previous meeting were read and approved.

A letter from Mr. Goodsell was read and acted upon favorably.

At this time the Educational Chairman, Mr. May reported on the educational program for the year. Some of the subjects planned for discussion, are Die Cast Cleaning, Bright Ni. Barrel finishing, Chrome plating, and several others.

It is also planned to have prominent speakers talk before future meetings on three or four subjects receiving the highest vote by the members. One of our own members Mr. LeRoy Camel read a very interesting paper on cleaning, and Mr. Siefin gave a very good talk on polishing, and polishing cement.

Plans were discussed to have a social event of some kind and Mr. Schuldt and Mr. Wieker were appointed on a committee to make the arrangements, and report at the next meeting.

A motion by Mr. Gerity, seconded by Mr. Shank to admit, the application of Mr. Roger Lindsay of the Harshaw Chemical Co., as associate member of the Toledo Branch of the A.E.S., was passed.

Divine
BUFFS

Divine quality shows in lowered buffing costs

Divine Brothers Company
62 Whitesboro St., UTICA, N. Y.
Quality Products Since 1892

The meeting adjourned at 10:10 o'clock.

G. H. BERGEMAN, *Sec.*

Grand Rapids Branch. The October meeting of the Grand Rapids Branch was held Thursday evening, October 12, 1939. The application of Mr. John Magnuson was accepted to membership.

The communication from Mr. R. M. Goodsell, relating to the drive for advertisement for the REVIEW and to stimulate interest in the members to write articles for an award of $50.00 offered by the Supreme Society was read.

The meeting was then turned over to Librarian Smith. The following questions were answered with the help of the members:

Q. How much chromium can be obtained from 100 *pounds of chromic acid?*

A. 34 pounds (approximately).

Q. How much sulphuric acid does it take to lower the pH of a 350 gallon nickel solution from 6.4 to 5.8?

A. This depends upon the composition of the solution. Between 9 to 12 fl. ozs. of sulphuric acid will be required for a 350 gallon solution.

Q. Will Sodium Sulphate increase the throwing power of a cold Watt's nickel solution?

A. Yes. But, a considerable amount would be necessary to make any substantial increase in throwing power. It would be more effective to reduce the nickel content and use less sodium sulphate.

The speaker for the meeting was Mr. Campbell who addressed the Branch on "Cleaning Die-Castings".

The process described consisted of an immersion cleaning tank utilizing a non-electrolytic solvent type material followed by a spray washer operation which removes the remaining tripoli "soil" and solvent film.

This process augments the electro cleaning cycle but does not supplant it. It is possible to reduce the electro cleaning time and effect a more complete removal of buffing compound. This process is designed to eliminate the use of a "degreaser" which is supposed to be more costly operation.

The novel points involved a discussion of the polmerizing of two or more solvents of the three and four carbon series. The presence of a solvent blanket layer at the top of the solution and an emulsified lower layer gives a two fold solvent and emulsifying cleaning action.

Mr. Campbell answered several questions directed at him on cleaning by this process.

CHAS. S. WHALLEY, *Sec.-Treas.*

QUESTIONS & ANSWERS

Reprinted from *Occupational Hazards*, Oct., 1939

Q. What is the effect of phenol and formaldehyde in the manufacture of our plastic products? C. H. Chicago.

A. Formaldehyde, is made from methyl alcohol and a commercial variety may contain as much as 15 per cent of unchanged methyl alcohol. It combines with the proteins of the body cells to form irreversible compounds. Some authorities say that its effect is local only; even when there is severe irritation of the air passages there is little evidence of absorption. Commercial formaldehyde is only 35 per cent

PERMAG

CLEANING COMPOUNDS

for cleaning Metal clean before electroplating

PERMAG Cleaning Compounds for cleaning before plating produce a surface that is chemically clean. PERMAG cleans quickly — saves time — saves high cost.

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Main Office and Factory
Third and Hoyt Sts. Brooklyn, N. Y.
Representatives, also Warehouses in Principal Cities.
In Canada: Canadian Permag Products Ltd., Montreal, Toronto

pure. There is a question whether the physiological action is traceable to the decomposition of formaldehyde into formic acid and methyl alcohol.

The most conspicuous effect of formaldehyde in industrial use is on the skin, eyelids, conjunctiva, and sometimes the cornea. Individuals vary much in their susceptibility to it, and in some cases a hypersensitivity develops. As always blonds seem to be more severely affected than brunettes. The affection is usually described as a moist eczema, but there may be ulcers. Conjunctivitis is a common complaint; keratitis is rarer.

Formaldehyde is mentioned several times in recent medical literature dealing with industrial poisoning, which was to be expected in view of the great increase in the use of plastics in recent years. Formaldehyde is used not only in the preparation of bakelite (from commercial phenol and formaldehyde), but also in producing the newer plastics which have casein as a basis or urea derivatives.

There is a difference of opinion among practical men as to whether bakelite itself is a skin irritant. The trouble seems to come from the solvent used in making objects from ground bakelite or in making bakelite varnish, such solvent as phenol, turpentine, methyl alcohol, but especially formaldehyde or hexamethylenetetramine, or both.

A number of cases have been found of weeping eczema in men working with a mixture of bakelite, varnish, turpentine, wood oil, and benzene, and tests ran down the varnish as the cause. They believed that phenol in the varnish was probably the real agent, for the victims of eczema were all hypersensitive to phenol.

Buffalo Branch. The regular monthly meeting of the Buffalo Branch was held at Bailey Bowling Academy on Friday, Nov. 10. The meeting was called to order by President Joe Ruff and the minutes of the previous meeting were approved as read.

This was "Toronto Night" and great credit is due the members of that branch (about twenty stouthearted men braved the rigors of very adverse weather conditions) in undertaking the hundred odd miles drive to Buffalo. They were introduced individually by their President, Mr. J. Acheson and were accorded a hearty welcome. Buffalo hopes to reciprocate soon and follow Toronto's splendid example with a return visit.

Mr. W. J. R. Kennedy, our Supreme Secretary then had a few words to say about the A.E.S. in general. He hoped with the greatly increased membership and more frequent advertising in the REVIEW, that funds would be available with which to further the scope of the research department.

The regular business of the meeting was concluded by a statement from our Treasurer, Mr. A. Boy whose praiseworthy efforts on behalf of the Branch, have not passed unnoticed. His report on the sound financial condition of the branch was most encouraging.

Dr. Wernlund then introduced the guest speaker, Mr. A. Smith of Toronto who gave an enlightening talk on "Anodizing Aluminum". He briefly outlined the history of aluminum, which because of its versatility, lends itself readily to the use of so many modern industries. It had one serious defect—it was corrosive and was liable to collect dirt if some protective coating was not applied. Lacquers had been used with indifferent success and the only real effective method was anodization. Difficulties had to be overcome

to do this successfully and in his paper were many technicalities which will be fully dealt with in a subsequent REVIEW.

He clearly demonstrated the various points by means of samples, and answered the different questions which such an interesting subject always evokes. He was accorded a hearty vote of thanks by the fifty or more members present.

The meeting adjourned at 11 o'clock and was followed by the serving of a fish-fry and refreshments, concluding a very enjoyable evening.

RODERICK MCGHEE, *Sec'y.*

Detroit Branch. The November meeting of Detroit Branch A.E.S. was held at Hotel Statler, Friday night, November 3rd.

Four applicants were elected to membership: Albert H. Clem, associate, Penna Salt Mfg. Co.; Lawrence Nagle, associate, Udylite Corp.; J. A. Raskin, associate, Udylite Corp.; Francis Reha, associate Udylite Corp.

One application was read and given to the Board of Managers for approval. George Perkins, associate, Purdue University School of Chemistry and Metallurgy Engineering.

Mr. George B. Hogaboom, of Hanson-Van Winkle-Munning Co., Matawan, N. J., spoke on the subject "The Overlooked Problems of Electroplating". Mr. Hogaboom stressed the fact that anode current density was the key to good anode corrosion, and metal replenishment in the solution; convection currents may be one of the reasons for poor distribution of plating now attributed to high current density areas; and in measuring current efficiencies the type of solution, polarization of anode and cathode, and the film on anode and cathode was not always taken into consideration.

The question box contained questions which gave valuable information, and the discussion kept the members' attention.

Announcement was made of the Annual Educational Session and Banquet with Dr. Colin G. Fink, Dr. A. Kenneth Graham, and T. F. Slattery as the speakers on Saturday, Dec. 9th, starting 2.00 P. M. Tickets will be sold at the door and sent only to those members making a request for the same. The committee felt that this year, they should know the attendance and plan accordingly, as last year they had to make room for an extra hundred

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Tested and Proven for the Plater's Needs in
PRE-CLEANING
CLEANING
POLISHING
FINISHING
MAGNUS CHEMICAL COMPANY
41 South Avenue Garwood, N. J.
Magnus CLEANERS

people at the last minute, causing considerable inconvenience.

WRIGHT WILSON, *Sec'y.*

Waterbury Branch held its regular monthly meeting at the Hotel Elton, Waterbury, Conn., on Friday Nov., 10th. The innovation of having an informal dinner before the regular meeting is proving very popular and many of the members are taking advantage of the opportunity to get better acquainted with each other.

The regular meeting was called to order at 8:00 P. M. by President Candee, who called on Vice President Colter to act as technical chairman for the evening.

The speaker of the evening, Dr. C. B. F. Young, Electro-metallurgist, New York City, gave a highly interesting talk on "Surface Tension" and its role in plating baths. He discussed the effect of various wetting agents on the surface tension and their effect on pitting and other characteristics of the electrodeposit, especially as applied to nickel baths. A lively discussion followed the talk after which Dr. Young was given a rising vote of thanks.

Dr. George Dubpernell gave a brief review of one of the latest books on "Organic Finishes."

The meeting adjourned at 10:40 P. M.

GEORGE MUSCIO, *Sec'y.*

Toronto Branch met on November 3rd, at the King Edward Hotel. President Acheson opened the meeting and introduced Mr. W. J. R. Kennedy of the Supreme Executive Board as guest of the evening.

The application of Mr. Charles Ward was balloted on and he was received as an Associate member.

A letter was read from David Aires of Preston, Ont. Dave is an old member and the boys were glad to hear from him and wish him well.

Under Good and Welfare our Chairman called on Mr. W. Young of the Westinghouse Company of Hamilton, Ontario. Twenty three electroplated samples of refrigerator parts were on display. These were of real interest to the members. Mr. Young had lantern slides of the Plating departments showing the layout of the tanks - the different solutions, such as cadmium, cobalt, nickel and chrome. Mr. Young's talk was a very interesting one and he brought out items of dips and rinses that might be overlooked by the average plater. Among samples was one of a refrigerator shelf made up of strips of flat and round iron rods, copper plated, nickel plated and finally dipped in a lead and tin mixture. This article had a white, smooth, bright appearance - a finish that could be classed second to none.

The members gave the speaker a hearty vote of thanks. Thank you again Mr. Young, come often.

At this point the chairman announced that Walter Barrows is seriously ill and flowers were ordered to be sent to the Hospital. We are all anxious about Walter and miss him very much.

President Acheson then called on Mr. Kennedy. Mr. Acheson said that this was the first time in which a member of the Executive Board had been present at any of our regular meetings and presented Mr. Kennedy with a souvenir to commemorate the occasion.

Mr. Kennedy then outlined his reason for coming to Toronto and expressed regret on learning of Mr. Barrow's illness. Mr. Kennedy complimented Mr. Young for his fine samples and stated that he was with the Westinghouse for twenty years and noted that the standard of the Westing-

house products were still in the same class, namely, quality first.

He also spoke of the REVIEW, the Research Committee, the advertising and he urged all platers to send in papers for publication. He answered many questions and asked for comments. One member preferred the index instead of an advertisement on the front page - another member objected to the fine glossy paper stating it was hard to read unless one had perfect eyesight. Mr. Kennedy shook hands with friends, old and new, all of whom asked him to come again.

Quite a number of the members will be able to go to Buffalo on Nov. 10, leaving the Hanson-Van Winkle plant at 4.30, covering the 124 miles in time for the meeting.

Mr. Archie Smith of Toronto Branch will give a paper on "Aluminum Anodizing".

Meeting adjourned at 10.45.

J. S. CAIRNS, *Sec.*

Anderson Branch of the American Electroplaters' Society held a dinner meeting at the Anderson Y.M.C.A. on Oct. 17, 1939 at 6:30 P. M.

Mr. W. M. Phillips, head of the Electro Chemistry Division of General Motors Research Laboratories, was the speaker of the evening and his subject was "Impression of European Plating Practice" and related subjects. Mr. Phillips supplemented his talk with lantern slides of many interesting pictures. Mr. Phillips' talk was followed by a general discussion in which many interesting questions were discussed. Everyone enjoyed the evening very much and we are all hoping to hear more from Mr. Phillips in the future.

A business meeting was held after the discussion and several matters of business were cleared up. A committee will be appointed by our President, Mr. E. L. McKinney to cooperate with Mr. R. M. Goodsell on the matter of securing papers for the MONTHLY REVIEW.

The applications of Mr. Carroll F. Matthews and Mr. Fred L. Brower were considered and both were elected to membership in the Anderson Branch.

Other matters of interest to the branch were discussed and the meeting was adjourned at 10:10 P. M.

OTTO W. MCCALLISTER, *Sec.-Treas.*

Springfield Branch. The October meeting of the Springfield Branch was

held at the Hotel Charles on the 23rd at 8:00 P. M., 36 members and guests were present.

The meeting was called to order by President Costigan. The minutes of the previous meeting were read and approved. The per capita tax bill was read and voted paid.

The following members were appointed to assist Mr. Frank Clark, Librarian, in obtaining speakers and preparing the programs for the remainder of the season:

November — Mr. Arthur A. Copp
December — Mr. William Siedel
January — Mr. Joseph Mongeau
February — Mr. James Calvert
March — Mr. Edmont Manley
April — Mr. Irving Niles
May — Mr. Colin Hastie

Mr. Kennedy reported that Mr. Frank Rickus has been confined at the Mass. General Hospital in Boston and it was decided that the Branch send him a condolence letter.

Mr. Frederick Fulforth of the Proctor Electric Company in Philadelphia was the speaker of the evening. He described the method employed at the Newman Crosby Steel Co. for producing strip steel of unusually high finish. The story was interestingly told and completely illustrated with moving pictures taken at the Newman Crosby plant.

Mr. Fulforth was kept busy for some time after the movie answering questions fired at him by our members and guests.

Everyone was well pleased with the meeting. The program was all that could be hoped for and the attendance was larger than the Springfield Branch has ever had.

The meeting was adjourned at 10:30 P. M.

D. S. HARTSHORN, JR.

Cleveland Branch. The regular meeting of the Cleveland Branch was held Saturday, November 4th, in Parlor No. 29, Hotel Cleveland. The weather was fair and chilly. The attendance 30.

The meeting was called to order by President Matts at 8:30 P. M.

Mr. Christ Vargo of the American Stove Co., Cleveland, Ohio was elected to active membership in the branch.

Mr. Scott reported that the Silver Jubilee Party, to be held November 11th, was all set and that reservations were coming in at a lively rate. Everything points to a highly successful party.

A letter was read from H. C. Luechauer, of Dayton Branch, urging the members to prepare papers for the coming convention. The letter was turned over to Librarian Hull for further action.

A letter was read from the Detroit Branch, inviting the Cleveland members to attend their annual educational session and banquet on December, 9th.

A letter was read from Mr. C. O. Werft, President of Grand Rapids Branch. Mr. Werft was a Charter member of Cleveland Branch and his letter was one of good humored congratulation on our twenty-fifth birthday. The reading of Mr. Werft's letter caused a good deal of reminiscing among the old timers. This gave some of the newer members a good insight into the "Good old days" when platers guarded with their lives their valuable secret formulas.

Considerable discussion developed on the question of meeting night. Both Saturday and Friday were highly favored and Tuesday received some support. The Secretary was instructed to poll the membership on the question by postal card.

The Secretary reported that he still had a considerable number of copies of

the 1939 Convention Proceedings uncalled for.

The speaker of the evening was Mr. Gus Soderberg, of the Udylite Corporation. He spoke on "Patents in the Plating Industry". This proved to be a very instructive talk on the procedure necessary to take out a patent. Mr. Soderberg enlivened his talk with bits of humor and he was roundly applauded upon the completion of his address. A considerable period of questioning followed.

Meeting adjourned at 10:25 P. M.

P. R. LYONS, *Sec.*

Bridgeport Branch. The regular meeting of the Bridgeport Branch was held November 2, in the Chamber of Commerce Rooms in the Stratfield Hotel. The meeting was conducted by President William Ehrencrona and about 30 members were present.

Herman Broun of the sick committee reported that Milton Hodges has been ill.

Clarence Helmle had nothing definite to report regarding the forming of a new chemistry class.

A letter from H. C. Luechauer was read requesting the members of the Bridgeport Branch to submit a Branch paper at the Dayton Convention. Clarence Helmle's motion was carried to appoint a committee to choose a suitable subject for a paper to be submitted at the National Convention.

Application of Abraham Brandiwine employed by the Empire State Novelty Co., of Shelton was read and accepted.

Mr. E. Bucy was to be the speaker at the open meeting November 24, on "The Latest Development in Organic Coatings".

Dr. Walter Meyer reported a meeting of the Research Committee was held. Numerous ideas were submitted but as yet no definite action was taken. Another meeting will be held shortly.

The members were entertained by Kenneth Schneider who showed some interesting sports films of some hunting and fishing trips. These films were greatly enjoyed by the members.

Meeting adjourned at 10:30 P. M.

EUGENE PHILLIPS, *Sec.*

Newark Branch The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, November 3rd 1939 in the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called to order at 8:30 P. M., with President John Kotches presiding. Other officers present were: George Wagner, Sec'y; Paul A. Oldam, Librarian; Stephen Leshnick, Sarg-at-arms; William Harrison, George Reuter and Harmon S. Hunt Trustees.

The mintues of the previous meeting were read and approved.

A communciation from the Philadelphia Branch with reference to their Annual Educational Session and Banquet was read, and it was suggested that as many as possible should attend this affair.

A communication from Mr. Franklyn J. MacStoker, Secretary of the New York Branch, with reference to a committee meeting for the scheduled 1940 Newark-New York Joint Banquet was read and placed on file.

An application for Mr. Joseph Ryder of Wright Aeronautical Corp., to active membership was voted to take the regular course. An application for Frank Taylor Mann of N. Ransohoff, Inc., to associate membership was voted to take the regular course.

Mr. Octavius Knight of Knight Brothers was then elected to associate membership.

Mr. George Wagner, Chairman of the 1940 Banquet Committee, stated a committee meeting was held just prior

to the regular meeting and that it was decided to hold the Annual Affair on March 30th at the Hotel Douglas, Newark, N. J. Mr. Paul A. Oldam will be in charge of the Educational Session and has promised to arrange a program which will be both technical and practical. The committee discussed the matter of the Banquet and it was suggested that we should try a new method for this affair. Something like a Buffet Lunch to be served from about 10 P. M. until Midnight with beer and soft drinks to be served all evening. In-as-much-as only Doc Young of the New York Committee was present it was decided to further discuss it at a future meeting.

Mr. Horace Smith stated that arrangements for a Bus to Philly would be made providing we could get 20 or more to travel by bus. He set the date of November 13th to make reservations with the Secretary.

Dr. C. B. F. Young of The Institute of Electrochemistry and Metallurgy in New York was next presented by Paul Oldam as the guest speaker for the evening. His subject was "The Proper Design of Racks and Shields for Electroplating". He started out by telling us some jokes which got the members in good spirits. He then proceeded with his talk which was accompanied by stereoptican slides. This proved very interesting and held the attention of the members for over an hour. He showed us how current flows thru a plating solution, how it can be deflected from points that would ordinarily burn under certain current densities and how more uniform deposits can be obtained.

Dr. Young was given a rising vote of thanks by the 46 members who attended this meeting which adjourned at 11 P. M.

GEORGE WAGNER, *Sec'y.*

New York Branch. The New York Branch held two scheduled meetings during the month of October at their headquarters in the Hotel Pennsylvania.

The first meeting on Friday, October 13th, was a short business meeting followed by an Educational Session, which included the showing of a very interesting and informative cinema presented by Mr. Austin B. Wilson of the Chevrolet Motor Corp., Detroit, Mich., Past President of the A.E.S., and present Research Committee Chairman. Mr. Wilson gave an extended talk and description of the metal finishing processes as carried out in the large automotive plants of the Mid-West. The meeting was very well attended, the membership turning out in goodly numbers, which was supplemented by the presence of a number of those members of the joint committees of the A.E.S., and A.S.T.M., who were present in New York for their annual Fall Session, included among whom were Dr. Anderson of the New Jersey Zinc Company, Carl Huessner of the Chrysler Corp., Paul Strausser, former research associate at the Bureau of Standards, President Ray Goodsell of the A.E.S., 3rd Vice President Nelson Sievering and the Executive Secretary and Editor of the REVIEW, W. J. R. Kennedy of Springfield, Mass.

President Liguori called upon the visitors for some remarks and they responded. Mr. Wilson's talk was well received and the movies were enjoyed, very much so, in New York, inasmuch as the local group has little opportunity to observe the operations of the large production plants of the motor industry. Mr. Wilson was extended a rising vote of thanks by the Branch for his effort of the evening.

The second meeting of Friday, October 27th, was a business meeting with

several important matters up for consideration. This was followed by the Question Box Hour conducted by the Librarian, Dr. C. B. F. Young, which held the interest of the members until 11 o'clock P. M., at which time the meeting was adjourned.

F. J. MACSTOKER, *Sec'y.*

Buffalo Branch. Toronto night was celebrated by Buffalo Branch on Friday evening, November 10. Although the night was cold and windy President John Acheson and thirteen members of Toronto Branch drove all the way to attend the meeting. Mr. Henry A. South, B.A. Sc., Chemist, Coulter Copper & Brass Co., Ltd., Toronto was the guest speaker. His subject was "The Anodic Treatment of Aluminum". The speaker's address, the samples submitted and the long discussion following the reading of the paper gave those present a good idea of the value of the anodic coating and its application to the various fields in which aluminum and its alloys are now being used.

Great interest was manifested in the subject, nearly everyone present having a question to ask the speaker who seemed to be able to supply each one with the information desired.

President Joe Ruff welcomed the visitors in his usual good natured manner. Over fifty were present including the visitors.

With Roderick McGhee as Secretary and Alfred Boy as Treasurer the branch is quickly getting the accounts and membership list straightened out. This has required a lot of work but it is pretty well completed.

Dr. Wernlund asked us when it would be possible to give Buffalo the privilege of entertaining the Convention. He pointed out the number of nearby branches willing to cooperate. Niagara Falls and other interesting features would also be an attraction.

Go after it boys! The wheel that squeaks the loudest is the one that gets the grease. We heartily commend the fraternal spirit shown by these Branches and this includes Binghamton-Syracuse and Rochester. The finest feeling of good fellowship prevails. Why not hold a regional meeting in this section and be sure to include Cleveland and Pittsburgh?

Remember the Detroit annual meeting December 9th. Speakers, Dr. Fink, Dr. Graham and Mr. T. L. Slattery.

RODERICK MCGHEE, *Sec'y.*

Philadelphia Branch meeting was called to order by President Joe E. Underwood. Applications of Mr. William Moclock and Mr. Thomas J. Fagden and Mr. Charles Wilson were reported favorably by the Board of Managers and they were duly elected members in their respective classifications.

The meeting was turned over to Mr. William Schnieder who gave an excellent lecture on the new Moly-Black process, illustrating his talk with slides. An interesting discussion followed. Mr. Schnieder also exhibited a large variety of samples. It was moved and seconded that Mr. Schnieder be given a rising vote of thanks.

The Banquet Committee reported all plans complete for a successful Educational Session and Dinner to those who will be able to attend.

The Resolution Committee read the suggestion of the Branch Research Committee for the benefit of the members who heartily approved of them. It was suggested that they be placed before the Supreme Society for proper action.

Vice President L. A. Critchfield reported full enrollment in the Platers'

Class at the J. McCaskey High School at Lancaster. Mr. A. Hirsch reported forty-two enrolled in the Evening Classes at the Jules Mastbaum Vocational Training School.

Librarian E. Zurbach reported that the speaker for the next meeting will be Mr. Leroy Beaver whose topic will be "Barrel Burnishing".

It was moved and seconded that the Branch hold its next meeting on December 8, 1939 at Harrison Laboratories, U.P. 34th & Spruce St., Philadelphia, Pa.

ROBERT E. JACKSON, JR., *Sec.-Treas.*

Dayton Branch. The members of the Dayton Branch held their regular meeting at the Engineers' Club on Friday Nov. 3rd, with Mr. Leon Haas, Vice President presiding.

Three applications were read and voted to take the usual course.

A letter from the Detroit Branch concerning their Annual Educational Session and Dinner Dance was read. Mr. Conley commented on this letter and several of the members are making arrangements to attend.

A resolution of sympathy for the death of Mrs Lewis Smith was read. Mrs. Smith was the wife of Lewis Smith, Chairman of the Exhibits Committee for the 1940 Convention and although she had been in ill health for some time it was a shock to the members of the Dayton Branch to learn of her death.

At this time the meeting was turned over to Mr. Luechauer who introduced our speaker for the evening, Mr. Eastman of the F. B. Stevens Co.

Mr. Eastman's subject was "Buffing and Polishing Composition". He explained the use of the many ingredients used in making up the different compositions and the good or bad characteristics of each. Two methods of testing compositions were discussed, the laboratory and the testing of the composition on actual production. The fact was brought out that the test of buffing compositions on actual working conditions was very often not carried far enough, both in amount of work run and the number of men to use the material being tested. Due to this fact the first order of a new compound does not always seem to give the same results as the test.

At the close of the question period following this discussion Mr. Eastman was given a rising vote of thanks. His talk brought out the fact that many of the platers cleaning problems might be solved by a close study of the Buffing or Polishing Compositions used.

At this time our meeting was adjourned.

CORLISS W. POWELL, *Sec'y.*

Pittsburgh Branch. The regular meeting of the Pittsburgh Branch was held Friday, Nov. 3rd. Mr. E. S. Taylerson reported on the Research Committee meeting held in New York City on October 13th. He requested that anyone having suggestions of work to be included in the Research Committee's Program get in touch with him as soon as possible.

Following the business meeting, Mr. Groh, Metallurgist for the Jones and Laughlin Steel Corporation gave an excellent paper on "Some Aspects of Tin Plate Manufacture and Coating". This timely subject was so interesting that a lively discussion followed the talk. Representatives of several steel companies and equipment manufacturers lent an atmosphere of enthusiasm evidenced the increasing interest in electro-deposited tin as a competitor of hot dipped tin.

The next meeting will be held Friday, December 1st.

F. R. KELLER, *Sec'y.*

Cleveland Branch celebrated its 25th Anniversary on Saturday Nov., 11 with a dinner dance at the Cleveland Hotel. Two charter members of the Branch were present and with their wives sat at the head table with President Fred Matts. Those two members were Mr. William Scott and Mr. A. D. Sopher. Messrs Matt and Scott spoke briefly regarding the history of the branch, past and present.

Mr. W. J. R. Kennedy congratulated the Cleveland members on behalf of the Supreme Society. There were over one hundred members and their wives present. Included in this group was Past President of the Supreme Society, Mr. E. Steen Thompson.

Mr. and Mrs. Frank Truden just recently married were given a big hand as they appeared on the floor ready for the dance. Mr. Truden was formerly the Branch Librarian. Mr. Scott's daughter was the recipient of the door prize and was she surprised?

President Matts is to be congratulated for the splendid type of men supporting him in office this year. With Fred Carlson, Vice President, Ross Lyon, Secretary and Dr. R. M. Hull, Librarian. The past year has also been a successful one. Here's hoping we may all live to help celebrate Cleveland's Golden Anniversary in 1964.

St. Louis Branch. Regular meeting of St. Louis Branch A.E.S., was held through the courtesy of Chandeysson Electric Co., at their plant where a dutch lunch was served.

Meeting opened by President H. Lubker, minutes of previous meeting were read and after one corrcetion were approved. Under elections of new members, FIVE were elected.

John Donnelly, 2704 S. 7th, St. Louis, Mo.; F. B. Holter, 456 Catalina, Webster Groves, Mo.; G. B. Smith, 7269 Arlington, St. Louis, Mo.; A. P. Wrisberg, 5624 Lissette, St. Louis, Mo.; N. E. Robinson, 3946 Folsom, St. Louis, Mo.

Motion was carried to suspend the rest of the business so as to give speaker more time. Motion carried.

Dr. Stout was present and made a few remarks. Glad to see you Dr., hope to see you often.

Meeting turned over to J. Vogt Librarian, who introduced Mr. R. Strong as spokesman for the Chandeysson Company. Thanked all for their attendance and was sorry that through illness Mr. P. Chandeysson could not be with us. We hope for his speedy recovery.

Mr. Henneke, Supt., of the plant, then explained how their generators were made, why the steel band was used, and the spider welded on the shaft. Explained every detail so all could understand.

In regards to brushes and commutators, Mr. Swartz explained how they are tested and also the care they be given, for if a brush should cut groove in commutator there is only one solution--take out all brushes and stone commutator.

We then formed in groups and inspected the entire plant. It was very interesting. St. Louis Branch thanks Mr. Chandeysson and his co-workers for their time and effort in making the largest meeting of the year.

Mr. Vogt stated the speaker for next meeting would be Mr. L. D. Dunn. Subject would be on cleaning. Mr. Dunn is with REX Products, Detroit.

Meeting to be second Friday in DECEMBER, central Y.M.C.A. Invite your friends!

CHAS. T. MCGINLEY, *Sec.*

Research Meeting

As reported in the October issue of the REVIEW many of our Branches as well as many of the leading companies in the country were represented at the Research Meeting held in New York on October 13th. Interest in this work was plainly evident.

Suggestions as to future work were received from a number of Branches, several companies and a few individuals. The Branches which submitted suggestions were: Baltimore-Washington, Bridgeport, Cleveland, Dayton, Detroit, Milwaukee, New Haven, New York, Philadelphia, Providence-Attleboro; Chicago sent in several well supported suggestions a day or two later and these have been sent to the committee members for consideration.

The suggestions received were many and varied. They covered practically the entire field of electroplating. Some of them included problems of great general interest. Others were of limited interest. A list of the more important follows:

1. Accelerated Corrosion on Cadmium and Zinc Plating.
2. Embrittlement Effect of Bright Nickel Deposits.
3. Effect on Plating by Surface-Polishing Steel.
4. Study of Metal Surface Finishes Prior to Plating.
5. Salt Spray Tests.
6. Ferrous Metal Surface Characteristics.
7. Current Distribution.
8. Pre-Treatment of Non-Ferrous Metals.
9. Symposium on Non-Ferrous Exposure Tests.
10. Cracking and Chrome Deposits.
11. Standard Cost-Figuring Methods.
12. Cleaning.
13. Study of Commercial Electroplating Baths Starting with Bright Nickel.
14. Attempt only Long Time Problems of General Interest.
15. Study of Effects of Various Addition Agents in Bright Nickel and Other Patented Baths, and Transmit This Information to Our Membership for Their Guidance in Control.
16. Diffusion of Deposits.
17. Barrel Plating Solutions.
18. Discontinue Research as Conducted; Establish a Bureau of Information so that Platers May Correct Their Difficulties by Using Its Facilities.
19. Discontinue Research and Use the Funds for a Paid Traveling Instructor.
20. Make a Survey of Quality of Plated Articles in Service and Determine the Standards Necessary to Secure Quality.

It can be readily seen from the scope of this list and even more so from some of the lesser but more specific suggestions not listed herewith that it is not possible to satisfy everyone. The best that can be done is to work on some problem the general support of which is evidence of a widespread interest in it.

A few questions as to the nature of the future research work must be answered before anything definite can be decided. Are we to undertake extensive and fundamental research on a long time basis or shall we have testing and ex-

perimental work of a more practical type on a short time basis or shall we have both to be run concurrently? The answer to this is important as on it will depend the future handling of the Research as to location, financing, etc. Will anything of a proprietary nature be considered as a satisfactory subject for research? There are many things other than the bright nickel solutions under this heading. Where shall we draw the line?

The general meeting lasted about six hours during which time the subjects listed as well as many others were discussed. After the general meeting there was a meeting of the Research Committee at which it was decided that those subjects which the general meeting had considered as possibilities for suitable research should be studied further and another meeting called in December to decide what should be done.

It seemed to be the consensus of opinion that work, if it was to be of any great value, would have to be on a long time basis but that if it was to be on a long time basis, it should be so sub-divided that periodical finished reports covering some phase of the work should be available at intervals of a few months or if this could not be so arranged a minor investigation should be run at the same time.

The preparation of metals for plating i.e., the cleaning, polishing, surface as received from mills, etc., seemed to be uppermost in the minds of those present.

Avoidance of anything more of a proprietary nature seemed in the air.

To a number of the suggestions the answers were already available and reference was made to the proper place to secure the desired information.

If any one cares to make any further comments they will be welcome, provided they are in the hands of some member of the Research Committee not later than December 2nd.

List of members and other interested persons present at the Research meeting October 13, 1939.

Carl Huessner	George B. Hogaboom
W. Blum	Walter R. Meyer
E. M. Baker	Adolph Bregman
Erwin Sohn	G. B. Hogaboom, Jr.
Maxwell W. Wise	Nathaniel Hall
Ernest Taylorson	T. F. Slattery
Gustaf Soderberg	B. H. McGar
W. A. Wesley	R. J. McKay
W. L. Pinner	F. C. Mesle
W. W. Hunlock	R. M. Goodsell
J. M. Hosdowich	R. J. Ligouri
K. W. Schwartz	N. F. Sievering
P. W. C. Strausser	F. J. MacStoker
E. J. Roehl	W. J. R. Kennedy
C. H. Sample	C. B. F. Young
A. Pearson	Frederick Fulforth
E. T. Candee	A. B. Wilson
A. W. Tracey	Joseph L. Downes
E. A. Anderson	H. LeRoy Beaver

THE DETROIT BRANCH HOT NOSE REPORTER HAS MORE NEWS

Carl Huessner took several of the members hunting, and the reporter overheard that it was a hunting trip deluxe, as Carl was a perfect host, and his sister-in-law cooked a most excellent chicken dinner.

Lindall is a crack shot, nobody denies that, but he isn't quite so particular what he shoots at, at times.

Jim Higgins claims he shot at half a dozen pheasants but in view of the fact that the rest of the boys claim they shot first, and jumped the fence quicker and retrieved the birds, it was difficult for Jim to attain his quota for the

day on that basis. But we wonder how he will explain to the game warden about the picture he had taken showing him holding about 8 pheasants in each hand.

Huessner was such a Scotsman that in order to win a 25c bet that he would hit a pheasant the first time he fired the gun, he carried the gun all morning without firing a shot in order to win his bet.

Mose Cherry was either too tender-hearted, or saving on shot gun shells to kill birds except with a stone in the hand, and lots of encouragement from the other fellows on the fence.

Jim Higgins is pretty good at target practice when it comes to blowing holes in mother earth. However, he claims that if somebody hadn't oiled the gun, it wouldn't have gone off unexpectedly.

The fellows who went hunting still feel so cocky that they will take on all comers from any other Branch to decide the best crack shot.

So much for hunting.

We would like to remark about a certain person who was in a hurry to avoid the crowd leaving the Michigan-Yale game, but locked his keys in the car. This person's initials spell G. T. McCray.

Mr. Leidy of Michigan Chrome Company, Detroit, the boy who makes the Microlite rack coating and operates a job shop, is justly proud of his newly altered plant and office. He has transformed his former building into a show place complete with display windows, sound proof offices and the works.

Its good to see Harry Webb of Service Plating Company of Detroit return back to good health again. For a long time Harry was ducking every time he saw a Knife as he was pretty well carved up before the Doctors got through with him. It is rumored that Harry can show every kind of incision from Hemstitching to zippers.

All was silence the other night at the Platers meeting when it came time for the newly elected members to be introduced. Four new members were elected and none were on hand to attend their maiden meeting. Perhaps the new members thought the meeting room had a brass rail.

George Hogaboom gave an interesting talk on a subject other than "what's under the plate". He was warned about the latter subject by an official of the waiter's union. It seems that "what's under the plate" concerns waiters a great deal more than platers.

Arguments developed at every meeting of the Detroit Branch. This time the argument centered around the distinction between throwing power, covering power, current distribution, etc., on and on. After the usual hour or two of discussion the result was the same. The technicians could have used a different word.

News Item

Joseph B. Kushner, B.S.Ch.E., well known electroplating engineer and a member of the A.E.S., has opened offices as an electroplating consultant at 20 Eldridge St., N. Y. C.

Possessing a great deal of experience in the field of electrodeposition both as a practical plater and research chemist, Mr. Kushner is well equipped to handle all problems that come up in modern electroplating practice. He intends to feature "Personalized Plating Service". With a specially designed portable chemical laboratory, Mr. Kushner is prepared to make rapid, accurate tests and analyses of his client's plating baths right on their own premises (unless otherwise specified). He feels that in this manner, knowing the particular problems of each plant by direct, personal contact with it, he will be able to give more to-the-point, practical advice, in the matters on which he is consulted as well as being able to keep a better check on his client's plating solutions. Another value of this "Personalized Plating Service", is that its users will not have to wait days for results of plating bath tests but will get them in a short while, in person, right from a man who is testing them on their premises.

Mr. Kushner is a graduate of the Cooper Union Institute of Technology and is widely known in the field for his papers in various trade Journals.

DETROIT BRANCH November 3 QUESTION BOX

Q. What is the effect of small amounts of manganese in nickel plating solution?

A. Small quantities of manganese of the order obtained in using potassium permanganate for purification have no effect. Considerably larger quantities have been thought to form colloids at certain anode current densities which deposit on the cathode forming rough deposits and porosity.

Q. Is there any cumulative effect of chromic acid vapors when inhaled besides the perforation of the nasal septum?

A. Research shows no cumulative effects other than psychological ones.

Q. Is not the poor current distribution in the plating tank due more to variable resistance in the electrolyte than to voltage drop in the metallic conductors?

A. It was agreed that under varying conditions, either or both would be important factors.

Q. What wetting agent might be used in mercury to reduce its surface tension?

A. It is not believed that any of the water soluble wetting agents will be helpful in this respect but it is well known that amalgamating metals such as copper and zinc with mercury cause considerable reduction of surface tension.

Q. Explain in detail the difference between throwing power, covering power and distribution.

A. Distribution of an electro deposit is a physical fact which can be determined by measuring the thickness of deposit at various points on a plated object.

The difference between throwing power and covering power is an old argument among members of the Detroit Branch. It was explained that covering power was very closely connected with the decomposition potential of the metallic salts in the plating solution.

Other members agreed that there is no fundamental difference between throwing power and covering power and it is doubtful if this question can be answered positively until these properties are better defined.

R. B. SALTONSTALL, Librarian-Detroit Branch

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Cecil Knights, sales representative of the Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturers of electroplating equipment and supplies, has been transferred from the Chicago to the Detroit office.

H. E. Moyer has been appointed Los Angeles sales representative for the Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturers of electroplating equipment and supplies. He is located at 4324 South Normandie Avenue, Los Angeles, Cal.

Myron Diggin, Chemist of the Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturers of electroplating equipment and supplies, addressed the Springfield Branch of the American Electroplaters' Society on September 25th on the subject of "Semi-Bright Nickel Deposits" and the "Ductility of Nickel Deposits".

NEW ANODE BAGS

A new anode bag, "Style D", is the latest development of the Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturers of electroplating equipment and supplies.

"Style D" bags are made from a closely woven Sanforized drill material. They are 5" wide, single ply with a special sewing. For anodes 12" to 20" long the bags are 4" longer than the anode. Anodes 20" to 40" long require bags 5" longer than the anode as there is more room needed for the collection of sludge.

In place of draw strings these bags are fastened to the anodes by two pieces of tape which pass through holes punched through the bag 1/2" down from the top.

The bags are impregnated top and bottom with a red resin. On bags for anodes 12" to 20" long the tops are coated 3" down and from the bottom 3-1/2" up. On longer anodes (20" to 40") they are coated 3" down from the top and 4-1/2" up from the bottom.

The advantages of these bags can be summed up as follows:

1. The impregnated resin tip greatly prolongs the life of the bag. It has been found in many plants that the anode bags fail first near the top, where they are alternately exposed to solution and air due to the changing solution level caused by evaporation or by the type of agitation employed. Where low pH solutions are used very early failure often occurs at this area with ordinary bags.
2. The resin coated bottom of the bag forms a pocket for the sludge, largely carbon, which accumulates as the anode corrodes. Carbon particles are very fine and we have observed in many instances that these particles work through the mesh at the bottom of the bag and cause rough deposits. This is especially true in solutions that are agitated. The carbon fills the bottom of the bag as the anode corrodes and with even a small amount of agitation this pocket is thrown against the tank wall with sufficient force to cause carbon particles to work through. The carbon cannot work through the resin-impregnated bottom of the bag. Consequently the solution is kept cleaner and the deposit is smoother.
3. With the top of the bag stiffened by the resin, a much simpler method of fastening the bags to the anodes is possible. There are no draw strings to pull and the cloth is not bunched around the hooks to act as a wick, and draw solution up by capillarity. Under such conditions, when the solution evaporates an unsightly crystal formation remains which becomes stiff and makes subsequent removal of the bags difficult.

   With the new simple closure the tops of the anodes stay clean and the bags are easily placed and removed.
4. The proper solution level can be determined at a glance. The solution level is normally somewhere along the red portion of the bag. As soon as the white cloth shows it indicates that water is needed to restore the proper level.

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Here and There

After many promises had been made to our Toronto members that some member of the Executive Board would pay an official visit to the Branch, we reached Ontario's fair city on Friday morning November 3, where Mr. John Acheson, President of the Branch was waiting to welcome us. Through Mr. Acheson's kindness in placing his time and car at our disposal, we saw many of the historic and beauty spots of Toronto. Incidentally we had the priviledge of saying hello to a few old friends, some of whom we hadn't seen for thirty years or more.

One thing most noticeable was the large number of young men in military training. Canada always loyal to the crown is losing no time in preparing for any emergency. One can only hope in admiring these young men, perfect physical specimens of humanity, that they will never have to see active service "over there".

The meeting at the King Edward Hotel was splendidly conducted. Everything was done without confusion, all the officers taking part in the opening ceremonies. Mr. Young, of the Westinghouse Company, Hamilton, Ontario, was the speaker of the evening and gave a splendid address on the plating operations done in his plant. Each detail was carefully covered as he showed the articles being plated in nickel, copper, zinc, cadmium, chrome, and tin solutions. Slides were used which showed the plating room layout. Samples of each part were also on display for the benefit of the members. Mr. Young showed his familiarity with each detail by answering the questions put to him, after the reading of his paper.

Several Westinghouse members and engineers were present at the meeting. Since most of Canadian plants are busy at present with many members of Toronto Branch working overtime, the attendance was exceptionally good.

The members showed their appreciation of the first visit to the Branch by a representative of the Supreme Society (the first since Walter Barrows was President) by presenting the Executive Secretary with a souvenir in memory of the occasion.

A rather sad part of the trip was a visit made by Mr. Acheson and the writer to the Toronto City hospital where our good friend Walter Barrows lies, seriously ill. His mind, alert as usual, he recognized us at once and was pleased to see us. Our hope is that this "grand old man" of Toronto Branch whom everyone loves and respects, will be on the mend soon, and be able to return to his wife and family in the very near future.

Thank you President Acheson and members of Toronto Branch for an enjoyable time. We hope our visit to your beautiful city will prove mutually helpful as we discussed together the various problems and the progress of the A.E.S.

Incidentally may we add that the members of the other branches of the A.E.S., deeply appreciate the fine spirit of cooperation shown by both of our Canadian branches and point with pride to the type of men in Toronto and Montreal who have worked so successfully to sustain the ideals of the A.E.S. Boundaries are no obstacles when men are united in a common cause that has proved beneficial to all.

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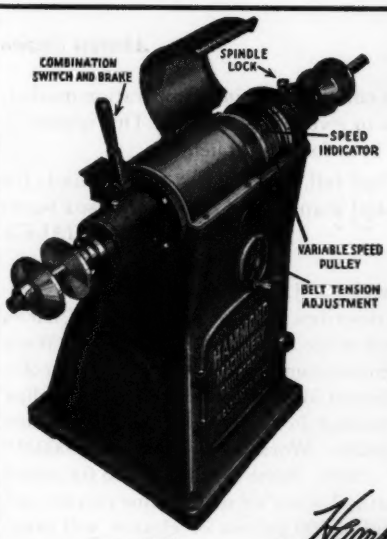
The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

Surface Treatment of Cadmium and Cadmium Plated Articles[1] Electroplating. By PRISTON, H. R. and CLARKE, S. G. *New Patents-The Metal Industry*, London, England, Volume **LIV**, No. 26. June 30, 1939. The formation of spots or discolored areas on the surfaces of cadmium or cadmium plated articles is prevented by immersing the articles in a plain solution of chromic acid or a soluble chromate or dichromatic. The article may be cleaned, dried by dipping in acetone and exposing to warm air, and then immersed for about 15 minutes in a 5 per cent solution of chromic acid, chromate or dichromate. For cadmium plated articles the immersion is normally effected directly after plating and washing. The treated articles are washed and then preferably rinsed in distilled water and dried rapidly; they may then be lacquered. ROBERT B. GOODSELL

Resistance and Protective Value. By DR. S. G. CLARKE, *Metallic Coatings, Metal Industry*, London, England. July 28, 1939, Volume **LV.** No. 4 pp. 87. Test of brite nickel compared to ordinary nickel deposited on nickel foil .001, exposed to atmosphere at Woolwich for 1½ years, showed within 3 months, some greenish corrosion. All bright nickel deposits showed more corrosion, both in loss of weight after removal of non-adherent deposits and appearances, than ordinarily. Nickel 1½ years old were greasy, colored with slight greenish corrosion. The thickness of metal corroded showed that the sulphanate type bright nickel more corroded than ordinary nickel. White nickel-cobalt type appreciably less. The latter showed the greater amount of adherent film after exposure. Appearances of brown stain on Cr deposits were investigated. Films resembling rust appeared on thin deposits of Cr direct on Cu. Due to Cu corrosion these films are formed. Pure nickel foil was chrome plated thickness from .00001 to .0001 and exposed to atmosphere for 1 year. Irrespective of thickness, greenish corrosion appeared in early stages. Brown corrosion stains were absent. Author advise heavy Ni deposits over Cu to insure absence of discontinuities at which Cu is exposed. Thicker Cr deposits upward from .0005 on steel showed little rust at end of 20 months in marine areas. Thick deposits of Cr over Ni .00005 to .0001 showed improved protection especially in industrial atmosphere. ROBERT B. GOODSELL

1. **Barrel Finishing of Metal Products.** H. LEROY BEAVER. "*Product Finishing*" August 1939 pp. 36-40. Author discusses further the different kinds of barrels for finishing plastics. Use of steel barrels lined with maple boards, as well as all-wood barrels fastened together with dowels, are recommended. Joints should be tight to prevent work sticking in cracks. Barrels with expanded metal screens are used for definning plastics in 1-5 hrs. Much work is in process to reduce the long times now necessary to barrel finish plastics. Long times chiefly due to lack of weight in plastics as compared to denser



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metal products. Need for compound to cut and shine in one operation needed. Another method is use of chemical dips to give lustrous finish. This is used in casein plastics work. No dips have yet been found for phenslico.

Barrels are generally loaded to only half full, as compared to two thirds for metal products. Shoe pegs of all sizes and shapes are a commonly used burnishing material. PHIL J. RITZENTHALER

2. Finishing Bathroom Hardware. J. J. CONNORS "*Product Finishing*. August 1939. pp. 19-25. Article describes finishing procedure at Charles Parker Co. Base metals are cast, forged or die cast, brass and bronze. Work is cut and polished, then degreased to remove compounds, and then given color with clean lime compound. Work is cleaned in alkaline cleaner, cyanide dips and then treated cathodically for one minute in a 20% sulfuric acid solution using lead anodes. This does not dull polish. Work is bright nickeled .00025" thick and then chrome plated. .00002" thick. Same racks are used for nickel and chrome and are stripped in HCl bath, 2 water rinses, alkaline cleaner and 2 more rinses. About 12cc Chromic acid in 300 gallons of cleaner will cause blistering of nickel. PHIL J. RITZENTHALER

Some Physical Characteristics of Oxide Films on Aluminum. N. D. PULLEN. *J. Electrodepositors Tech. Soc.*, **15,** (preprint) 6 pp. (1939). The composition and structure of films on anodized Al have not been settled. The author found by X-ray examination that the films from CrO_3, H_2SO_4, and oxalic acid baths are amorphous. The films formed in the CrO_3 bath are practically anhydrous Al_2O_3, but the oxalic acid and H_2SO_4 films contain one mol. of water per mol. of Al_2O_3. On boiling with water, the CrO_3 and oxalic acid films show evidence of crystal structure and correspond to the monohydrate with an additional mol. of water probably held in the lattice. The CrO_3 films are contaminated with about 0.1% of Cr; the oxalic acid films with about 3% oxalic acid; and the H_2SO_4 films, with about 13% SO_3. The flexibility of films was measured by determining the minimum radius of curvature at which cracking of the film occurred. The following empirical relation is given: Flexibility Index $= R^{\log x}$, where R is the radius of curvature and x is the film thickness in inches. The most flexible films are formed with a.c. current and high bath temperatures. The methods of measuring the hardness of the films are not satisfactory. The hardest films are produced with d.c. current and at low temperatures and high electrolyte conc. The breakdown voltage of films is almost proportional to their thickness for the range 0.0002-.0008 inch. About 30,000 v. is required per mm. thickness of film. Individual films may have breakdown values of 1,000 v. A. BRENNER

The Treatment of Magnesium Alloys in Hot Chromate Baths. E. G. SAVAGE. *J. Electrodepositors Tech. Soc.*, **15,** (preprint) 8 pp. (1939). Protection of Mg and its alloys by sherardizing metal spraying, or electrodeposition have not been satisfactory. Better results are obtained by chemical immersion treatments. Two chromate immersion treatments developed by the Royal Aircraft Establishment, Farnborough are described. One process requires a

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6 hr treatment and has been largely superseded by a 30 minute process. The bath for the latter process consists of $(NH_4)_2SO_4$, 3% by wt.; ammonium dichromate, 1.5%; $K_2Cr_2O_7$, 1.5%; ammonia (sp. gr. 0.880), 0.35% by vol.; pH = 5.8-6.4 (brom-cresol purple). The bath is operated at the boiling point. The pH at which the best results are obtained varies with the nature of the alloy. If the bath is too acid, the coatings are loose and if too alkalin, the coatings are thin. Preparatory to the coating treatment, the parts are cleaned by a 10 sec. dip in 5-10% HNO_3 or H_2SO_4, or by 20-30 min. immersion in a boiling alkalin cleaner. Coatings may be stripped in a hot strong CrO_3 solution or by immersion in the following pickle; HNO_3 (sp. gr. 1.42) 1 part by vol.; fuming HNO_3 (sp.gr. 1.5), 1 part; nitrobenzine, 9 parts; CCl_4, 1 part. The areas of the specimens which are not to be coated are "stopped off" with rubber. The chromate solutions are preferably contained in Al tanks, but iron tanks may be used. The chromate coatings are usually covered with paint or varnish.

A. BRENNER

Anodic Films on Aluminum and its Alloys for Protection Against Corrosion. J. W. W. WILLSTROP and H. SUTTON. *J. Electrodepositors Tech. Soc.*, **15**, (preprint) 16 pp. (1939). The Bengough-Stuart (B-S) anodizing process was carried out with different forms of voltage regulation, using a 3% CrO_3 solution at 105°F. The thickest films (wt. = 4 g/sq. meter) were obtained at 70-80 v. The films formed at 50 v. were slightly thinner (wt. = 3 g/sq.m.), but much less electrical energy was consumed in their production.

A still bath yielded thicker films than one that was agitated; however, a moderate agitation was advisable for the maintenance of a uniform bath temperature. The effect of a.c., d.c., and superimposed a.c. and d.c. current on the anodizing of Al and duralumin was studied. With the 3% CrO_3 bath, a.c. alone produced no film, and superimposed a.c. and d.c. had no advantages over d.c. alone. Anodizing in oxalic acid solutions (2-8%) or H_2SO_4 solutions (16%) yielded good films with either a.c. or d.c. alone, and with superimposed a.c. and d.c. The loss in wt. of metal in the H_2SO_4 solution was larger than in the CrO_3 solution (0.1-.3 g/dm.^{2} as compared with 0.005-0.02 g/dem^2.) In a sea water corrosion test, duralumin anodized by the B-S process was less corroded than specimens anodized in oxalic acid solutions. Steaming improved the protective value of the oxalic acid solutions but decreased the protective value of the B-S process films. Mechanical tests, which were made on anodized specimens before and after a corrosion test, showed that the B-S process films were slightly superior to the films produced in HS_2O_4 solutions. The authors discuss the increased protective value obtained by applying grease or varnish to the films.

A. BRENNER

Electrical Degreasing with Simultaneous Deposition of a Metallic Film. By V. P. SACCHI. *Ind. meccan.*, **21** 117-23, 215-19 (1939). The degreasing of a metal previous to electroplating an alkaline cyanide bath which not only degreases but at the same time deposits a slight metallic film, preferably copper, but also cadmium, is discussed and methods and solution for sutiable baths are described. The advantages of this method over simple degreasing are (1) Cold baths can be used which last for years if properly main-

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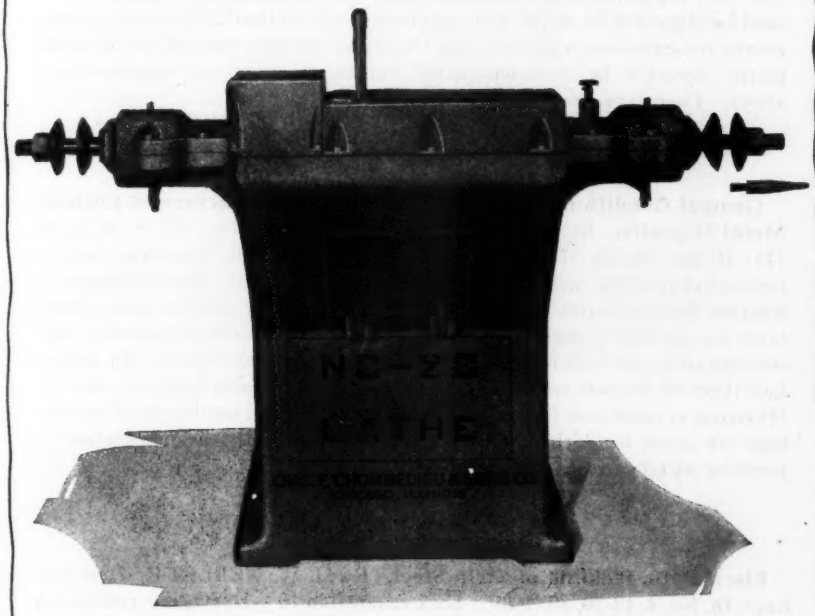

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tained; in spite of their high cost these baths are therefore very economical. (2) There is better throwing power, probably because of the deposition of copper whose hudrogen overvoltage is greater than that for iron. (3) The degreasing process is more easily controlled, as the copper film indicates more reliably perfect degreased condition. (4) Passivation of the ferrous metal base during the transfer from the degreasing bath to the plating bath is greatly retarded by the copper film. This degreasing bath can be applied to iron, steel, cast iron, copper, all types of bronzes and zinc die castings. It should not be used for objects to be plated with cadmium or zinc as the direct contact of iron-zinc or iron-cadmium is prevented by the copper deposit; further, not on nickel-plated objects to be chromium-plated, nor on aluminum and aluminum-rich alloys. Twenty-two references.

M. HARTENHEIM
Chemical Abstracts **33** 5924 (1939)

General Conditions Governing the Type and Structure of Cathode Metal Deposits. By O. S. FEDOROVA. *J. Gen. Chem.*, (U. S. S. R.) **8**, 1711-16 (in English 1717) (1938). An empirical rule for obtaining various forms of electrolytic metal deposits is as follows: high c.d., slow circulation of solution, low concentration of metal ion (down to $1\text{-}10^4$N) and low temperature favor fine-grained deposit; while low c.d., rapid circulation of solution, high concentration and high temperatures favor coarse-grained deposits. In general four types of deposits are distinguished: (1) dense metallic layer, (2) spongy, (3) coarse crystals and (4) mixed types. Examples and conditions of electrolysis are given for each of these types, particularly for the preparation of *powdered nickel deposits*. Ten references.

S. L. MADORSKY
Chemical Abstracts **33**, 4881 (1939).

Electrolytic Pickling of Strip Steel. By H. W. NEBLETT. *Iron Steel Engr.* **16**, No. 4, 12-20, 30 (1939). Scale removal in 10% H_2SO_4 is expedited by electrolytic action. Electrodes of 8% antimony and 92% lead are supplied with a.c. at 100-150 amps./sq.ft. The strip speed (continuous) is 120-170 ft./min. Discussion includes description of fused caustic soda electrolytic pickling of steel in which cathodically formed nascent sodium reduces the scale (oxide).

F. W. FINK
Chemical Abstracts **33**, 4881 (1939).

Bright Silver Plating. By J. FISCHER. *Oberflachentech.*, **16**, 78-81 (1939). The requirements of a satisfactorily operating bath are discussed. According to the latest views the cause of a bright deposit is a submicroscopic formation of silver sulfide, and additions used to obtain bright deposits should conform to the general formula CSx(NA) (NB) or COx(NA) (NB) where A and B can be hydrogen, hydrocarbon groups, or both together, as for instance $MeHNCSSH_3NMe$. (Cf. Abstract Section, *The Monthly Review A.E.S.*, October 1938, p. 778). Such additions also reduce the voltage of the bath. Experiments with a new kind of addition (composition not given) are described which was used in a nitrate-obtaining bath (with $AgNO_3$ and KCN) where for differ-

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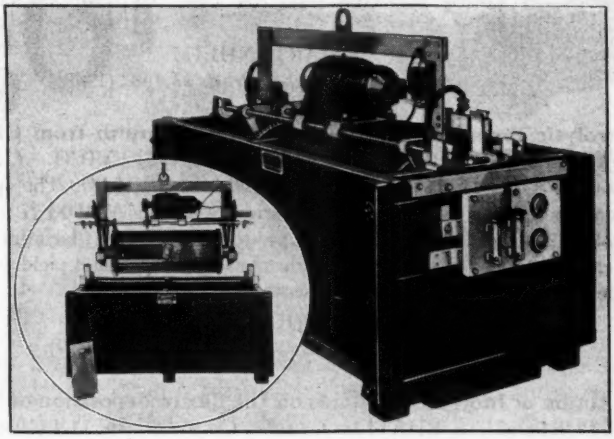

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ent cathodic c.ds. the voltage dropped to about 2/3 after addition of this substance. The addition can be used in all cyanide silver baths; c.ds. up to 18.6 amps./sq.ft. can be applied in a bath with 20 g./1. silver. The deposits from the bath with the new addition are harder and tarnish less. The throwing power is better in an unstirred bath and at higher temperature; free KCN increases the throwing power only after some time. Photographic reproductions of deposits from an ordinary silver bath and from one with the additions show the difference.

M. HARTENHEIM.
Chemical Abstracts **33**,4882 (1939).

Electrolytic Preparation of Carbon-free Chromium from Chromic Salt Solutions. By L. N. GOL'TS and M. S. IZRAILEVICH. *J. Applied Chem.*, (U. S. S. R.) **11**, 1398-1422 (in German 1422-3) (1938). The optimum conditions for the electrolysis of $CrCl_3$ solutions were: Cr 35-100 g./l.; NH_4Cl in catholyte 1-4 mol/l., c.d., 93-372 amps./sq.ft.; 20° C.; Platinum anode; copper cathode; glass filter (No. 4) diaphragm. The chromium yield was 30% current efficiency. The idea needs further study.

A. A. PODGORNY
Chemical Abstracts **33**, 5746 (1939).

The Action of Inorganic Colloids on the Electrodeposition of Nickel. By V. S. PURI and V. S. BHATIA. *J. Indian Chem. Soc.*, **16**, 71-4 (1939). The electrodeposition of nickel on copper plates in the presence of sols of Prussian blue, silver, $Fe(OH)_3$, and arsenic sulfide was studied. Arsenous oxide yields a dull and very rough deposit. while other sols yield a fairly lustrous, smooth deposit. The nature and concentration of the sol affect the nature and amount of the deposit. The original bath contained in g./l. $NiSO_4$ 26 2/3, B_3O_2 10, and 6 1/3 KCl. Irrespective of charge on colloid, nickel ions form a complex with the colloid, which travels toward the cathode cataphoretically.

R. K. CARLETON
Chemical Abstracts **33**, 5748 (1939).

Cobalt Plating with Insoluble Anodes. By P. M. LUK'YANOV and T. N. BEREZOVA. *J. Applied Chem.*, (U. S. S. R.) **11**, 1426-31 (in French, 1431) (1938). The electrolysis of $CoSO_4.7H_2O$ solution at pH of 2.5-2 and c.d., of 144-720 amps./sq.ft. produced smooth cathode deposits of silver gray color. The cobalt deposits were non-porous even at the thickness of .00028-.00048".

A. A. PODGORNY
Chemical Abstracts **33**, 5748 (1939).

The Anodic Protection of Magnesium. By J. FRASCH. *Metaux & Corrosion* **14**, 83-96 (1939); *Chemical Abstracts* **33**, 8121 (1939). The oxide film formed by anodizing magnesium is not resistant to corrosion. The best protection is obtained by a.c. deposition of chromium and manganese oxides with suitable after-treatment; these resisted salt spray 3 to 8 weeks, depending on the magnesium alloy used. ERNEST H. LYONS, JR.

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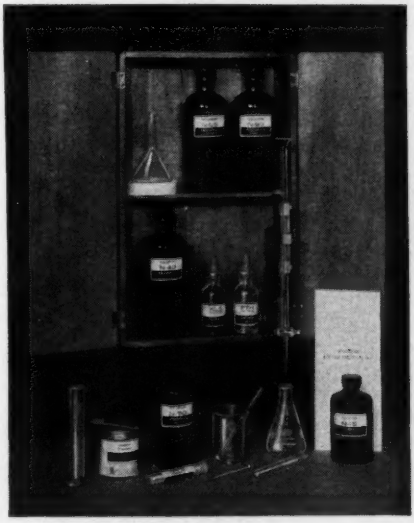

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